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Prehistory Research Series

THE BOWEN SITE
AN ARCHAEOLOGICAL STUDY OF CULTURE PROCESS IN THE LATE PREHISTORY OF CENTRAL INDIANA

By
JOHN T DORWIN

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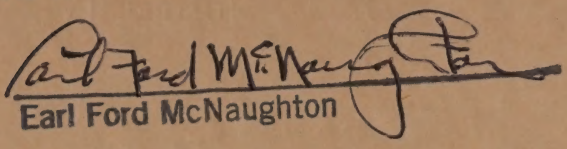

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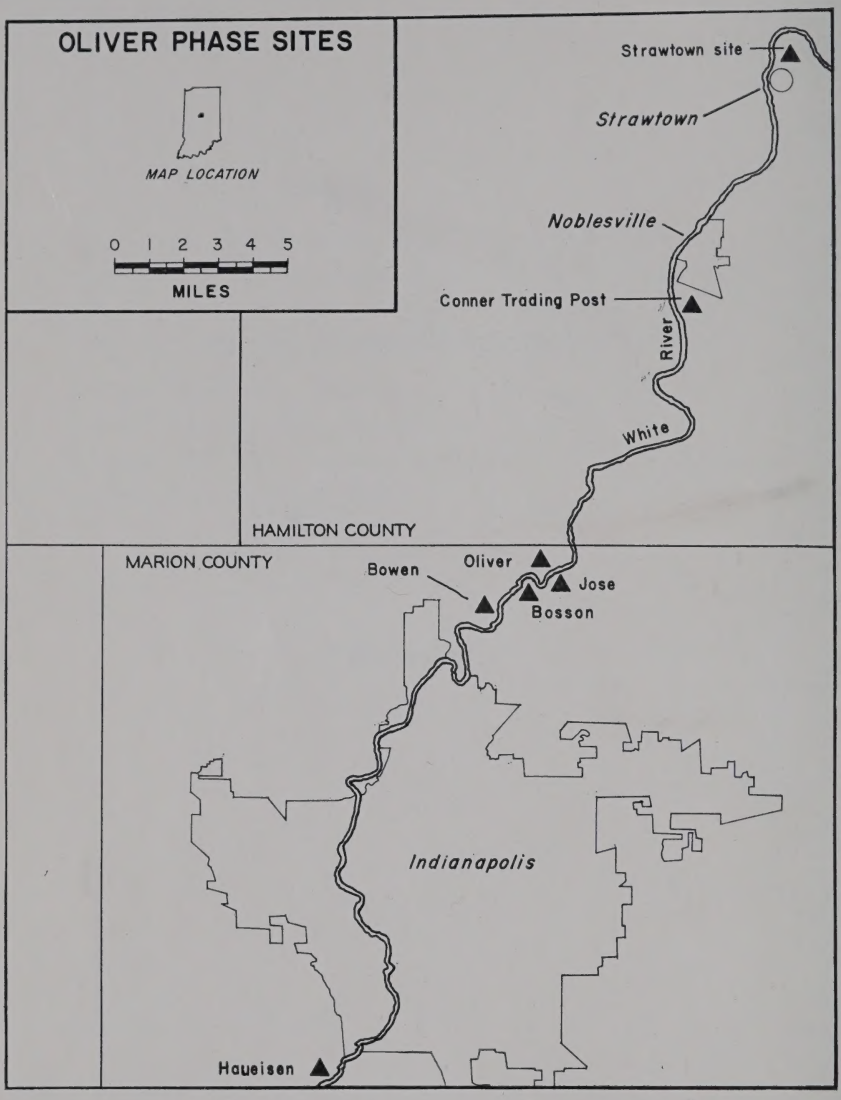
OLIVER PHASE SITES
MAP LOCATION
0 1 2 3 4 5
MILES
Strawtown site
Strawtown
Noblesville
Conner Trading Post
White River
HAMILTON COUNTY
MARION COUNTY
Bowen
Oliver
Jose
Bosson
Indianapolis
Haueisen

FIGURE 1

THE BOWEN SITE
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PREFACE

The following study grew out of the salvage excavation of the Bowen Site in northern Marion County, Indiana. The unique assemblage of artifacts recovered there suggested far-flung spacial relationships with temporal placement rather late in the prehistory of the area. What started as an attempt to explain how diagnostic elements of widespread archaeological cultures came to be combined in central Indiana, resulted in the formulation of a statement of culture process, with perhaps greater applicability than merely to the present investigation. The role played by the frontier zone of cultures in contact became the focus.

The theoretical position is simply that where there is no geographical or political interference, the frontier between cultures becomes a zone in which there is considerable exchange and recombination of ideas, both across the frontier and *along it*. The processes at work involve a greater receptivity to change on the part of frontier peoples, engendered by their relatively frequent encounters with novel ways and ideas. Thus cultural elements originating at one end of a frontier might show up all along it, but not necessarily in the hinterlands to either side due to the relatively lower receptivity to change of the peoples away from the frontier zone who are not so constantly confronted with alternatives.

A secondary objective of this investigation is based on the fact that all or very nearly all of the site was excavated. This presented the unique opportunity to apply some excavation sampling procedures and to test their results against the known universe of the entirely excavated site. It was intended primarily as a cautionary exercise and demonstrated concretely that as yet procedures are not generally adequate to provide very reliable samples of an unknown universe such as the archaeological site.

The list of those who made significant contributions to this study is long. The thanks of the writer, as well as the many students and volunteers who worked at the Bowen Site over the years, is

gratefully extended to the officers and employees of the American Aggregates Corporation, who made the work possible. In particular, the president, W. L. Theime, and the district manager for Indiana, Neill R. Garrison, are to be commended for their patience and extensive consideration.

In the summer of 1959, the American Aggregates Corporation began gravel removal operations in the area of the Bowen Site. John C. Householder, field archaeologist for the Indiana Historical Society, learned of these operations in August. He requested the company to refrain from working part of its holding until he could salvage at least some of the site he knew to be located along the White River on the eastern part of the land tract involved. The company agreed to do so and permitted excavation of almost the entire aboriginal settlement. In what must be some kind of a record for co-operation in such a project, the American Aggregates Corporation waited through six years, until 1965, before resuming operation in the area of the finished excavation. In the meantime it moved its operations to the west of the site and constructed lengthy overhead conveyor belts to carry gravel across it to the river for washing. In this way virtually no destruction was caused to the site by graveling. Life for a salvage archaeologist would be much sweeter if such co-operation were more common.

Among those who participated extensively in the excavations, in addition to John C. Householder, who directed the operation throughout most of its existence, were Patrick Morris, Richard Furlow, James Gibson, Robert Kiste, Robert Little, and Edmund Lewis. Many other interested persons and students from Indiana University also spent periods of time working at the site. Through the courtesy of the Indiana State Police, Mr. Householder was able to fly over the site and take aerial photographs.

Financial support for the entire excavation as well as for the analysis of the recovered data was provided by the Indiana Historical Society. The Glenn A. Black Laboratory of Archaeology at Indiana University supplied the space and other facilities necessary for preparation and examination of materials, while the Graduate School of

the same institution provided funds to visit the Ceramic Repository of the Museum of Anthropology at the University of Michigan. There the writer benefited from the comments of James B. Griffin and James E. Fitting. The Research Computing Center of Indiana University provided computer time and consultation as needed. W. Richard Adams and William H. Adams identified the animal bones while the late Georg K. Neumann spent long hours in an unheated barrack building at Angel Mounds helping the writer analyze the human skeletal remains. My colleagues at the University of Kentucky, Henry F. Dobyns, Art Gallaher, Jr., and Albert Bacdayan, proved excellent sounding boards for ideas about, and models of, culture change. William H. Marquardt drew the maps and Leslie S. Harrold made the drawings of the pottery rim profiles and decorative motifs. Many others contributed in less obvious ways. My sincerest thanks to all of these and especially to James H. Kellar who, as advisor, played a major role in the formulation and execution of this analysis. Final responsibility for errors or misinterpretations, of course, rests with the writer.

JOHN T DORWIN

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PART I

INTRODUCTION

INTRODUCTION

A Brief Orientation

The Bowen Site was occupied by people with thoroughly mixed cultural characteristics of Late Woodland and other late prehistoric peoples. In many ways the site reflected change, but it was particularly obvious in the pottery and subsistence pattern. The pottery manifested such features as curvilinear and rectilinear guilloches, strap handles, cord-impressed designs, sharply flaring rims, cambered collared rims, globular forms, and some shell but mostly grit tempering—a clearly mixed ceramic complex. Exploitation of the environment was diffuse, using Cleland's terminology,[1] and involved corn agriculture, fishing, musseling, and hunting as well as some collection of wild vegetable foods.

Superficially, at least six other sites in the area appear to have been closely related to the Bowen Site. The Strawtown, Haueisen, Bosson, Jose, Conner Trading Post, and Oliver sites, along with the Bowen Site, form a newly defined phase which has been termed the Oliver Phase, in deference to Griffin's use of the name Oliver for this complex on a map of his 1946 synthesis of eastern United States prehistory.[2]

From the beginning of excavation at the Bowen Site it was certain that something unique and important was being uncovered. The particular nuances did not become clear until nearly ten years later, but Glenn A. Black's instructions to the first field party leave no doubt of his awareness of the site's potential. He felt the surface collections indicated that Fort Ancient–Late Woodland relation-

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[1] Cleland, Charles E., *The Prehistoric Animal Ecology and Ethnozoology of the Upper Great Lakes Region* (University of Michigan Museum of Anthropology, *Anthropological Papers,* No. 29, Ann Arbor, 1966), p. 43.

[2] Griffin, James B., "Cultural Change and Continuity in Eastern United States Archaeology," in *Man in Northeastern America,* edited by Frederick Johnson (Robert S. Peabody Foundation for Archaeology, *Papers,* III, Andover, Mass., 1946), p. 76.

ships would be further delineated, probably with stratigraphic differentiations between the two. Later when pits containing quantities of the various pottery types mixed together were uncovered, Black suggested the two occupations were contemporaneous, but distinct cultures occupying the site in harmony. The actual single, but hybrid, occupation remained to be discerned.

For years John C. Householder has been one of the staunchest workers in Indiana archaeology, albeit on a "part-time" basis. His efforts in Marion County have made it the most extensively surveyed county in the state. No excavation worthy of the name has been undertaken in the Indianapolis area without his presence. It is no surprise, then, that "Jack" first reported the site in the early 1930s, and ultimately was responsible for the salvaging of it between 1959 and 1965.

The first field party to excavate at the Bowen Site was under the direction of Patrick Morris, a graduate student at Indiana University. Since the operation began late in the summer, he along with his crew were soon forced to return to school for the fall semester. Early in September, 1959, Householder assumed responsibility for the excavation, a position he maintained until the site was finished in 1965.

The writer spent a total of only two days at the Bowen Site during the time it was being excavated, but became interested in the extensive collections recovered from it for a number of reasons. First, they represented, for all practical purposes, the total material residue of a prehistoric people which could be recovered by the methods employed. That is, the entire site had been excavated, and the opportunity to engage in some testing of archaeological sampling procedures was presented. Second, the true nature of the occupation or occupations which produced the unique ceramic constellation was an intriguing question mark. And, finally, the unknown quantity of the appropriate temporal and cultural period of central Indiana prehistory, despite the discussion of some apparently similar sites by Griffin in 1943, promised to be an exciting problem.

As noted above, the initial response to the Bowen Site was

based upon its unique ceramic assemblage. Briefly stated, this consisted of grit-tempered, cord-marked bowls with smoothed rims ranging from an open S, in profile, to vertical, to sharply everted. Decorations consisted of horizontal rows and chevrons of cord impressions or punctates of various kinds, and of curvilinear and rectilinear guilloches made by broad-line incising or trailing. Rarely, there was also a shell-tempered sherd.

The first report of the above kind of Fort Ancient–Woodland combination in the Indianapolis area was by Weer.[3] He had excavated two burials and several refuse pits containing the mixed assemblage at the Haueisen Site on White River in southwestern Marion County. Lilly[4] reported and illustrated a sherd with the S-shaped rim from the Conner Trading Post again on White River, but this time north of Indianapolis in Hamilton County. A study of the pottery surface collections from Marion County[5] made no attempt to deal with questions raised by the presence of the disparate pottery types.

The first real attempt to incorporate the Indianapolis area sites into the framework of the late prehistory of the Ohio Valley was made by Griffin in his work, *The Fort Ancient Aspect.* In a chapter entitled "Fort Ancient and Central Indiana," Griffin examined the ceramics from the Haueisen, Oliver, Bosson, and Strawtown sites as well as two sites given Indiana Historical Society Accession Numbers 225 and 229. He wrote:[6]

> It is evident that the majority of the pottery in the area so far collected is most nearly related to wares thought to be Woodland and believed by some writers to belong to a late Woodland horizon in the north central area. Upon this basic Woodland type features strongly suggestive of Fort Ancient were engrafted; occurring with these examples

[3] Weer, Paul W., *Sweeping a Prehistoric Floor* (*Indiana History Bulletin,* XII, No. 5, Indianapolis, 1935), pp. 161-68.

[4] Lilly, Eli, *Prehistoric Antiquities of Indiana* (Indiana Historical Society, Indianapolis, 1937), p. 253.

[5] Householder, John C., "Surface Pottery from Marion County, Indiana," in Indiana Academy of Science, *Proceedings,* 1940 (1941), pp. 36-38.

[6] Griffin, James B., *The Fort Ancient Aspect* . . . (University of Michigan Press, Ann Arbor, 1943), p. 266.

are sherds which appear to have been brought into the area from Fort Ancient sites in southeastern Indiana or adjacent Ohio. There is also a strong suggestion at some of the sites of influence from the Fisher Focus, although this ingredient is less strongly marked. None of the sherds seem to me to be Fisher sherds. There is also a subtle resemblance to Iroquoian pottery traits, which are not as strongly marked as the others already mentioned.

. . . . . .

It is, perhaps, possible to interpret this cultural assemblage as an original grouping from which later cultural centers developed; each of these would have seized upon and elaborated a number of pottery elements here somewhat mixed together. The only explanation which seems valid at present is that the various elements represented here, after development in their type areas, subsequently merged.

Householder reported on the Oliver Site in some greater detail. He maintained that it was the product of a basically northern Woodland people raised to a sedentary status by cultural borrowing, primarily from Fort Ancient.[7]

The most thorough examination of the ceramics and sites is that contained in a work by Vernon Helmen.[8] The materials from the Oliver Site were examined for cultural relationships in an attempt to place them specifically in time and space. The result was a recognition of Early, Middle, and Late Woodland, as well as Fort Ancient and Fisher Focus ceramics. Unfortunately the lack of excavated material prevented the contemporaneity of the Late Woodland and Fort Ancient–Fisher elements being delineated. However, it was clear that there were far-flung relationships which needed to be explained but which had to await excavation.

Thus when excavation began in 1959 the broad outline of the questions of the relationships of the unique assemblage of pottery was available. What precisely was the relationship of the material within the Bowen Site? What relationships existed between the complex sites in the Indianapolis area? What were the

---

[7] Householder, John C., "The Oliver Farm Site," in Indiana Academy of Science, *Proceedings,* 1944 (1945), pp. 29-32.

[8] Helmen, Vernon R., "The Cultural Affiliations and Relationships of the Oliver Farm Site, Marion County, Indiana" (Master's thesis, Indiana University, Bloomington, 1950).

obvious and not so obvious relationships between the sites and other contemporaneous cultural groups in the eastern United States, and finally, why should these relationships exist?

None of the methods chosen to study the problems under consideration were unique. They involved considerable time but where experimentation took place it was primarily in the realm of the writer expanding his own knowledge rather than innovating new methods and techniques for studying prehistory.

The first step was to describe as completely as possible the material culture inventory and relate this to the environment. The aim was to determine how the people of the Bowen Site lived and what activities engaged their time. Admittedly the result was far from a total picture. In the course of doing this, a computer was used to do the arithmetic and to print descriptions of the potsherds in a code which greatly simplified additional handling of that particular data. Also, during this aspect of the study the excavation results were subjected to treatment by various sampling procedures now in use in archaeological investigations. The purpose was to test the totally excavated Bowen Site results against what might have been obtained by the use of these sampling techniques.

The final effort of the investigation was an attempt to understand, via culture process, something of the conditions which contributed so much to the seemingly disparate constellation of cultural elements present in the series of central Indiana sites.

The Natural Setting

The Bowen Site was located on the north edge of Marion County, in central Indiana. It lay along the north bank of the West Fork of White River in the NW ¼, NE ¼, NW ¼, Section 30, T17N, R4E. In recent years the northward expansion of the city of Indianapolis has virtually surrounded the area.

The elevation of the site was between 725 and 730 feet above sea level, while the pool stage of the river was 712 feet above sea level. It was thus, thirteen to eighteen feet above the river. There was a gradual slope from the occupation area down to the river,

which was roughly one hundred yards away. Flooding of the site was common in recent years but was not evidenced, in the excavations, for prehistoric times.

The central portion of the state of Indiana is almost entirely within the physiographic province known as the Tipton Till Plain.[9] This is an essentially flat vast plain with little relief and little modification by stream erosion. Its southern boundary is marked by the Shelbyville Moraine in the west, while in the east it is marked by the northern margin of a transitional zone which has topography similar to that of the till plain but also shows the form of the bedrock beneath the rather thin drift. The glacial plain is flat to slightly rolling but with a number of glacial features present, including low eskers, esker troughs, meltwater drainage ways, and numbers of end moraines. The last include the Champaign, Bloomington, Crawfordsville, and Chatsworth moraines in the west and the series of concentric moraines, Salamonie, Mississinewa, Wabash, and Fort Wayne, in the northeast.

The main features of the plain are the result of the advance and retreat of the Wisconsin glaciation which reached its maximum approximately 21,000 years ago. At that time the main ice advance covered two thirds of Indiana and had reached as far as the Shelbyville Moraine. A slight retreat took place and then a readvance to the Crawfordsville Moraine. This sequence took about 1,000 years according to William J. Wayne.[10] The readvance covered a thin silt bed which lay on top of the till of the previous advance. The fossil snails and plant remains of the silt suggest that in the interim the area was covered by tundra and scattered spruce trees.

The tills of the two advances are first the Cartersburg Till Member and then the Center Grove Till Member, both of the Trafalgar Formation. Ice that deposited the Trafalgar Formation

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[9] Malott, C. A., "The Physiography of Indiana," in *Handbook of Indiana Geology,* edited by W. N. Logan *et al.* (Indiana Department of Conservation, *Publication 21,* pt. 2, Indianapolis, 1922), p. 104.

[10] Wayne, William J., "Ice and Land," in *Natural Features of Indiana,* edited by Alton A. Lindsey (Indiana Academy of Science, Indianapolis, 1966), p. 34.

came from the northeast as indicated by striations and esker trough lineations, and carried large amounts of outwash sand and gravel whose composition reflects bedrock materials reaching northeast into Canada. The White River was one of the major outwash streams of the advances which formed the previously noted features and thus was responsible for depositing large amounts of sand and gravel along its course. This deposition of sand and gravel was particularly great along the upper reaches of the river in Marion County, Indiana, due to the heavier materials settling out first as the outrushing water began to slow down. The result is that all along White River in that area there are numerous sand and gravel pits in operation today. It was because of the presence of these sands and gravels that the American Aggregates Corporation was operating in the vicinity of the Bowen Site.

The gravels, which were the object of the American Aggregates Corporation's activities, were buried well below the artifact-bearing stratum. In fact, it would be somewhat misleading to refer to the zone which contained artifacts as a stratum since that would suggest some kind of noticeable separation between it and the nonartifact-bearing zones. There was none. Stratigraphy consisted of a plough zone which extended, on the average, to a depth of 0.7 foot. Below that there was homogenous brown silt as far down as any of the excavations reached. This was to a depth of 4.8 feet in one feature. Since nearly all features had been disturbed in their upper levels by the ploughing, it was apparent that the original ground surface was nearly the same as at present. The next level would have been the gravel-bearing stratum which lay at a depth of nearly ten feet in some parts of the area and deeper in others.

A study of the present ecology of the floodplain forest of the White River[11] demonstrates a condition which probably existed aboriginally and which will later be of significance as regards the

[11] Lee, M. B., "An Ecological Study of the Floodplain Forest along the White River System of Indiana," in *Butler University Botanical Studies,* VII (1945), 155-75.

vegetable food resources which were evidently exploited by the inhabitants of Bowen Site. Within this rather restricted zone, there were seventy-one species of woody plants with ten tree species accounting for 86.2 per cent of that kind of plant life. The ten were: silver maple, sycamore, American elm, cottonwood, hackberry, cork elm, box elder, black willow, white ash, and red elm. Important understory trees were hawthorn, redbud, wild plum, hop hornbean, and flowering dogwood. Elderberry, spicebush, wahoo, swamp privet, water ash, and pawpaw were the most important shrubs; and vines included poison ivy, grapes, greenbrier, trumpet creeper, and Virginia creeper. All of these are listed in descending order of importance.

The large number of tree species sharing dominance is important. All floodplain species are relatively intolerant to shade, but produce abundant seeds which germinate well and become established in soils of high moisture content. Thus, the excellent moist environment along the mature White River permits a more mixed forest than would be found over a similar distance in upland forests.

The animal life of central Indiana and the White River Valley is reflected in recently published lists of mammals, fishes, and birds found in the area.[12] Included are all reliable reports of species from 1800 to the present. Thirty-nine species of mammals are listed, twelve of which are now extinct in the region; twenty-five species of fishes; 253 species of birds including four recent imports, two now completely extinct species, and ten species which no longer occur in Indiana but still do elsewhere; and finally, eighty-one species of amphibians and reptiles including nineteen salamanders, two toads, ten frogs, fourteen turtles, six lizards, and thirty species of snakes. In addition, there are several common species of mollusks which were of some significance at Bowen Site.

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[12] Mumford, Russell E., "Mammals," in *Natural Features of Indiana*, edited by Lindsey, pp. 474-88; J. Dan Webster, "The Birds," in *ibid.*, pp. 452-73; James R. Gammon and Shelby D. Gerking, "The Fishes," in *ibid.*, pp. 401-425; and S. A. Minton, "Amphibians and Reptiles," in *ibid.*, pp. 426-51.

In regard to the climate James E. Newman, an agronomist at Purdue University, writes,[13]

> According to Koppen's world-wide designation of climates, Indiana has a humid, mesothermal-microthermal, continental climate. The key words in this description are "humid" and "continental." Indiana has no definite dry period or season with an average humidity less than 50%, thus it is humid in all seasons. The seasonal changes exhibit the continental influence, namely the extreme cold periods in winter and the extreme hot periods in summer. Indiana's climate is definitely transitional from south to north. The southern half falls within Koppen's mesothermal (Caf) type meaning a warm temperature climate similar to those found in the South and East. The northern half falls within a microthermal (Daf) type meaning a cool temperature climate similar to those found in the North and East.

Thus we may say that the Bowen Site lies in the middle of a climatic transitional zone. This means specifically that normal annual precipitation (1931-1960) is forty inches, most of which falls in the form of rain between April and September. Numerous heavy thunderstorms in summer account for a significant proportion. Mean daily minimum temperatures for January and July (1931-1960) are 22° and 64°, respectively, while mean daily maximum temperatures for the same months are 39° and 87°. The average number of frost-free days is 170.

All these data support a fact already well known to most observers: central Indiana is corn-growing country.

Excavations

Excavation at the Bowen Site was begun in August, 1959. During the course of the total of six field seasons a number of times it appeared that the excavation was about to be concluded by the activities of the gravel operation. In other words, each field season appeared to be the last. Inspection of Figure 2 shows that three-foot-wide trenches and ten-foot-square blocks were the basic excavation units. At first the trenches were measured from a series of

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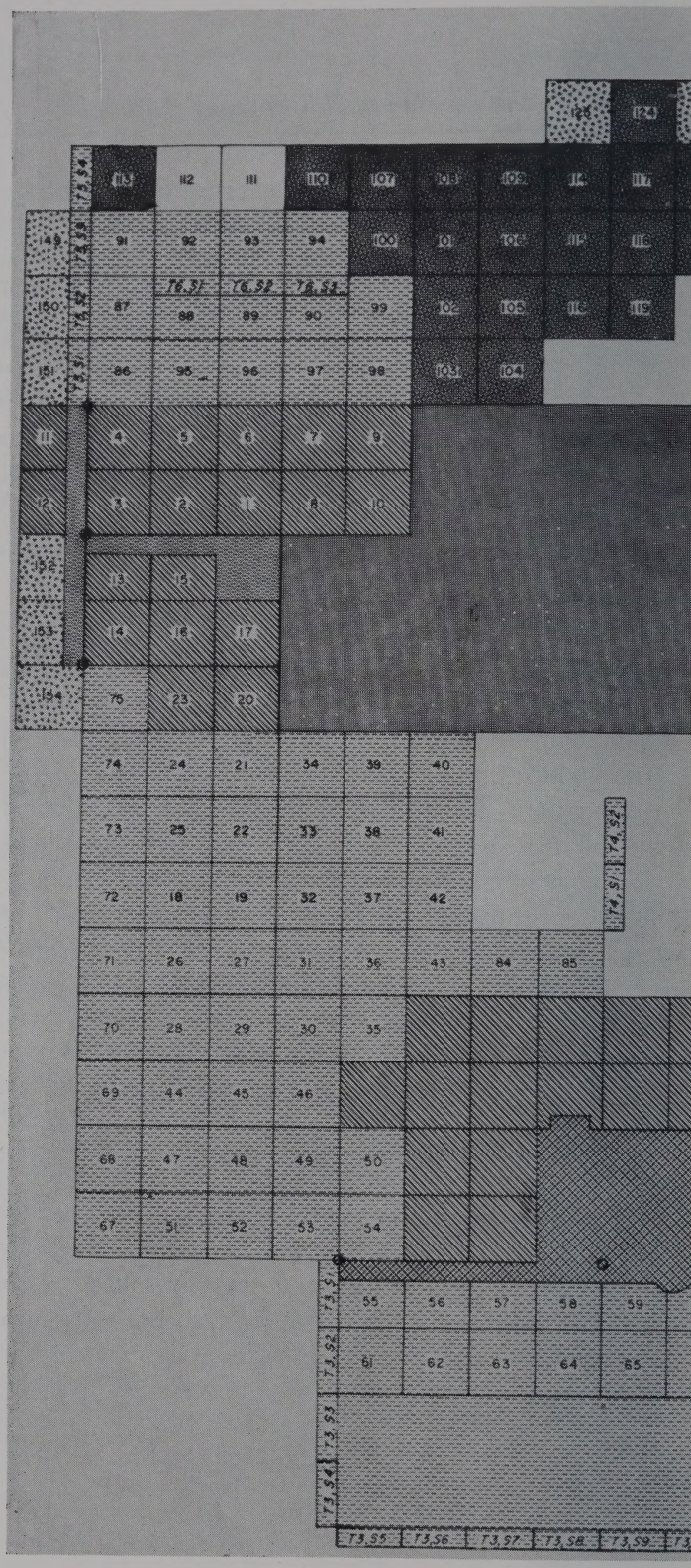
[13] Newman, James E., "Bioclimate," in *Natural Features of Indiana,* edited by Lindsey, p. 171.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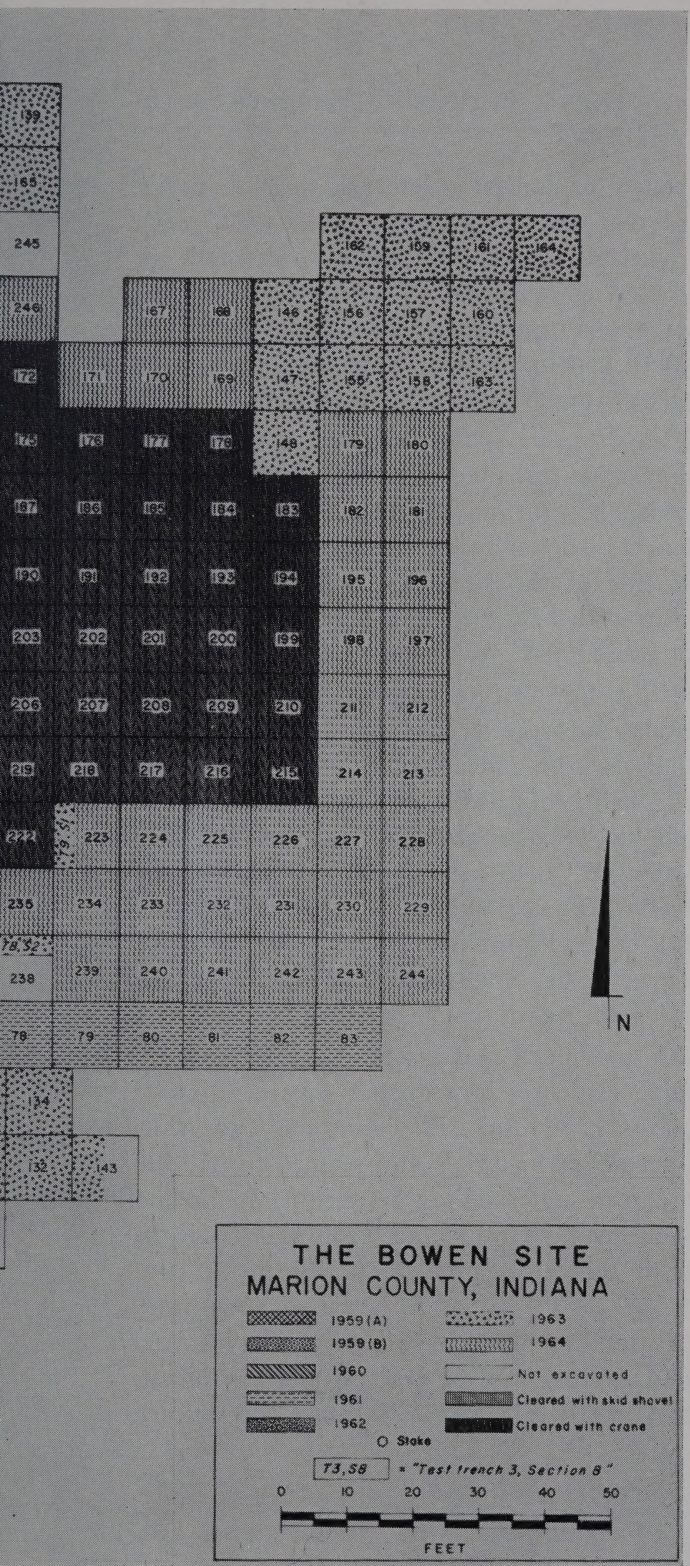
THE BOWEN SITE
MARION COUNTY, INDIANA
1959(A)
1959(B)
1960
1961
1962
1963
1964
Not excavated
Cleared with skid shovel
Cleared with crane
O Stake
T3,S8 = "Test trench 3, Section 8"
0 10 20 30 40 50
FEET
N

stakes numbered one through ten and set at intervals throughout the south and west parts of the site. All features and artifacts were plotted relative to one of these stakes; i.e., ten feet west and 1.5 feet south of Stake 2. Later, as large areas were opened, ten-foot squares were used but locations continued to be written relative to the stakes. It was not until late in 1960 that the ten-foot squares began to be designated by number, greatly simplifying record keeping.

Squares were numbered serially as each was excavated, making a sometimes sudden jump from one side of the site to the other as expediency dictated such moves by the workers. Thus Block 148 is on the east side of the site while Block 149 is on the west, and Blocks 126 and 144 are on the north side while Blocks 127 and 143 are on the south.

The 1959 season at the Bowen Site had a two-fold purpose: first, to recover materials and record contents; and second, to ascertain something about the size and layout of the site which a hundred years of plowing had badly disturbed. Toward these ends two areas of trench and block excavation were undertaken. The first lay in what was later shown to be the southern part of the site and was labeled Unit A. The second was in the western part and was labeled Unit B (see Figure 2). Large quantities of debris, refuse pits, burned areas, and several burials were encountered. However, no evidence of house structures was seen.

In 1960, areas north of Unit A and east of Unit B were excavated in hopes of finding evidences of a greater concentration of occupation and, particularly, habitations. However, the areas thus uncovered were nearly devoid of materials and seemed to indicate that the main concentration of materials lay between Units A and B and possibly to the southwest. Throughout 1960 and 1961 the principal objective was to solve this problem of the layout and orientation of the site.

During the 1961 season the problem was apparently solved by excavations north and slightly east of Unit B and northwest, west, south, and east of Unit A. The result was that the western

half of the site was shown to be a series of refuse pits and burned areas, with an occasional post mold. A small circular pattern of the latter was noted by the writer in the field drawings of the southwest section but no supporting data could be found. Therefore, only the suggestion of a structure was possible. These features lay in a semicircular pattern with the interior area relatively sterile. Work in 1962 through 1964 confirmed the occupation pattern as a complete circle with no features in the central part.

Excavation was conducted principally by hand methods with the exception that in the central area mechanical equipment was used to clear the plough zone.

The grid map shows a total area of 34,240 square feet within the extreme limits of the excavated area. Of this figure 22,920 square feet were excavated by hand, 3,100 square feet were cleared by skid shovel in search of features, 4,900 square feet were cleared by crane for the same purpose, and 3,320 square feet were unexcavated. Artifacts recovered were primarily pottery sherds (29,786), chipped stone (2,453), ground stone (105), and bone (91). In addition large quantities of unworked animal bone and mussel shell were recovered. Large numbers of carbon, ash, and earth samples and a few botanical specimens were also saved. There are also records of some 120 features and assorted post molds, floor plans, plus photographs, and field notes.

PART II

DESCRIPTION AND ANALYSIS

OF ARCHAEOLOGICAL REMAINS

DESCRIPTION AND ANALYSIS OF ARCHAEOLOGICAL REMAINS

The Artifacts—Kinds and Quantities

The various classes of artifacts, unmodified materials, and habitation features are described and analyzed internally in the following sections. Every attempt was made to include as much information as possible. It should be kept in mind, however, that a severe limitation was placed on the data. The excavator was not the analyst. The idea that a well-excavated and recorded site can be completely analyzed by any competent archaeologist is a theoretical ideal which this writer firmly believes is unattainable. Too many unrecorded impressions and only half-realized observations go into the head of the excavator but never find their way onto paper. They are, however, an integral and important part of the total picture, for they call to mind associations to be checked and details to be run down which would never occur to the person who was not present at the excavation.

Despite this difficulty, there is a significant and usable body of information which adds substantially to our knowledge of the late prehistory of central Indiana specifically, and the eastern United States generally.

The following is a list of the kinds and quantities of artifacts recovered from the Bowen Site.

Table 1. *Artifacts from Bowen Site*

Bone:	
Beamers	33
Awls	42
Hook	1
Pins	4
Needle	1
Pendants	5
Cut beaver incisor	1
Worked os penis of raccoon	1
Cut bird leg bones	2
Spatula	1
Polished bone	1
Ear spool or ring	1
	91 items
Antler:	
Cut tine, includes one not completely severed from rest of antler	10
Projectile points	12
Flakers	4
Pendant (?) tine with groove worn around it 5 mm. from base	1
	27 items
Chipped Stone:	
Projectile points and fragments	124

TABLE 1. *Artifacts from Bowen Site*—continued

Chipped Stone (continued)	
Blanks	42
Drills and drill tips	20
Gravers	2
Scrapers	27
Chipped slate slab (scraper?)	1
Knives	7
Chips	2,119
"Checked" pebbles	110
Ferrous chert core	1
	2,453 items

Celts including one miniature with burial	7
Abraders	9
Sandstone pallette	1
Pipe stem partial and of slate	1
Gorget, one hole, slate	1
Unfinished quartzite bannerstone	1
Triangular slab of hematite with two beveled edges	1
Piece of hematite with three faceted surfaces	1
	105 items

Ground stone:	
Manos	18
Manos with anvil	17
Mano and hammerstone	1
Mano and anvil and hammerstone	12
Metates	6
Anvils	16
Hammerstones including one ball hammer	13

Miscellaneous:	
Heat-cracked rock fragments	52
Burned limestone fragments	31
Shell cut discs, 12-20 mm. in diameter unperforated	4
Burned Clay	6
Copper	2
Amorphous, shell-tempered fired clay object	1

WORKED BONE

There were thirty-three bone beamers. Thirty-two were made from the metapodial bone of a deer. They were made by cutting away one side of that long leg bone and sharpening the two resulting edges. The beamer's probable use was as a kind of draw knife for the scraping of hides and other materials. One beamer was made from the femur of a bear.

Forty-two awls were made from a variety of bones of various species. There were nineteen of the most common type, those made from the metatarsal of a turkey. The distal end was removed and the shaft sharpened. Deer ulnas (four) were also made into awls by sharpening the distal end. Two broken beamers were sharpened to a point and used as awls as was a bear penis bone. In addition, there were seven awls made from deer long bone splinters, one from a deer rib bone, and five from unknown bird bones. Three awl tips were of unidentified bones.

Only one bone fishhook was found at Bowen Site. It was short shanked, with the hook span nearly as great as the length of the shank. There was no notching or evidence of any other means of attaching of the hook to a line. It appeared to have been made by drilling a hole in a flat piece of bone and cutting the hook from

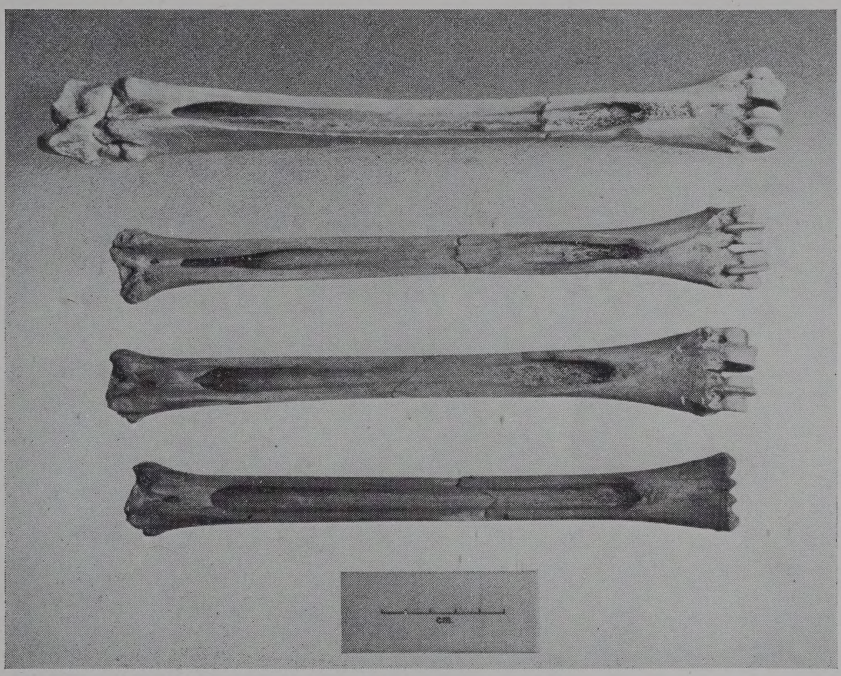

Plate I. Bone Beamers from Bowen Site

around the hole. The hole itself became the space between the point of the hook and the shank.

Four small slivers of bone which were smoothed and pointed on both ends were classified as pins. The four averaged 8 centimeters in length and 2 millimeters in diameter. The kind of bone used in this manufacture was unknown.

There was a large flat needle which was made from the floating rib of a deer. The distal end was sharpened to a point

while a hole was drilled approximately 1 centimeter from the proximal end. The whole specimen was approximately 20 centimeters long.

A bear canine drilled through the root of the tooth and the os penes of a raccoon and a bear, both drilled through the proximal

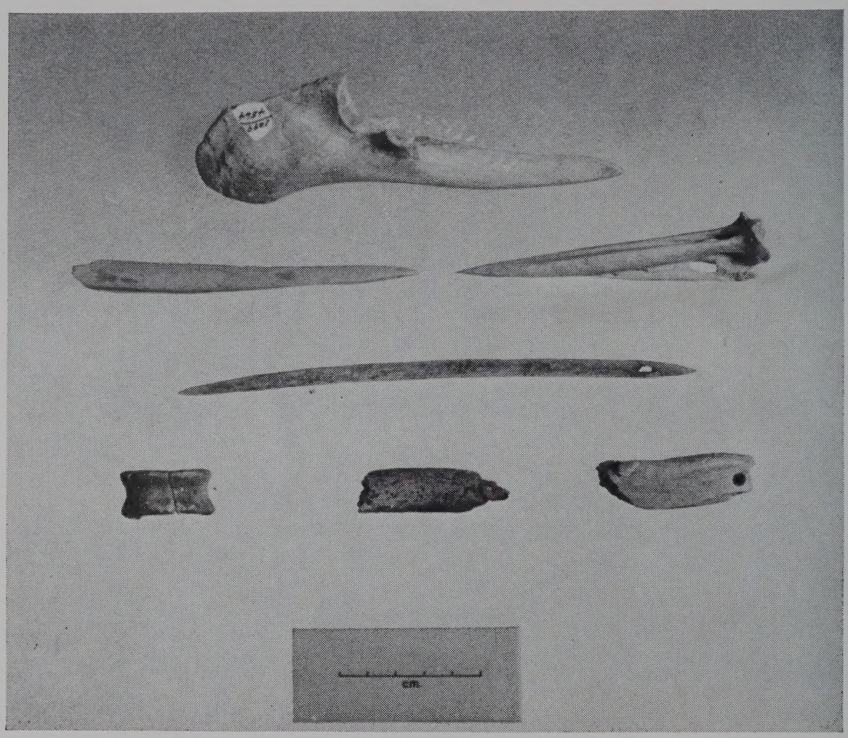

Plate II. Bone Awls, Needle, Ring, Pendant, and Drilled Tooth from Bowen Site

end, were classified as pendants. No modification occurred beyond the drilling.

A piece of deer leg bone which had been split and smoothed, with one end beveled, was classified as a spatula. It was 12 centimeters long by 2.5 centimeters wide and probably was a reworked broken beamer.

One bone artifact was described as an earspool. It appeared

to have been made from a transverse section of the long bone of a large animal such as a deer or bear. It was hollow, 2 centimeters in diameter, and had a breadth of nearly 1 centimeter. The thickness of the bone wall was approximately 2 millimeters. The wall had been ground considerably, both on the interior and exterior surfaces. The former was essentially flat while the latter had been ground to produce a broad shallow groove around the outer surface. The slight concavity which resulted would have helped greatly in keeping the spool in an ear lobe, if, indeed, that was its use. Griffin noted a similar object of clay from the Fisher Site in northern Illinois.[1]

A number of bone items bore evidence of human modification but not with any recognizable specific function. These include a cut beaver incisor, a raccoon os penis with two V-shaped notches at the approximate mid-point, two diagonally cut bird leg bones, and a piece of unidentified highly polished bone. The latter was 5 centimeters long, 1 centimeter wide, and 5 millimeters thick.

Worked Antler

There were twenty-seven pieces of antler showing some alteration by man. Ten of these were simply tips of tines which had been cut from the main stem of the antler. One had not been completely severed from the main stem.

There were twelve projectile points made by hollowing the base of tips like those above. None were cut diagonally to form a tang.

Four tines seemed to have been used as flaking tools, showing the tip wear and basal polish characteristic of such artifacts.

The final antler piece was a tine tip which had been removed from its antler stem but which also had a groove worn around it some five millimeters from the base. It may have been a pendant or it may have been the product of a workman who began to cut the tip off at one point, changed his mind, and cut it off slightly lower.

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[1] Griffin, *The Fort Ancient Aspect*, p. 282.

Worked Stone

Chipped Stone

The cherts used varied considerably in texture, ranging from very fine, easily controlled materials to coarse, gritty stones which were more difficult to chip and less efficient to use. The primary reason for the range of materials was probably because their source was river transported, glacial gravels from many places. Frequently pebbles were found with a small flake removed from one corner or which had been split as if the knapper were checking the quality of the material before proceeding. Such "checked" but nonutilized pebbles were invariably coarse and unsuitable for flaking. Those which were suitable were presumably used since no fine-textured pebbles were found which had been tested in the above ways.

A total of 2,229 chips, pebbles, and partial pebbles were recovered, of which 2,119 were chips and 110 were "checked" pebbles. Since the river pebbles were not of great size, 77 per cent of all chips retained a portion of the cortex of the original pebble. Twenty-six per cent of all chips were classified as primary decortication flakes and 51 per cent were classified as secondary decortication flakes. The remaining 23 per cent were secondary chips including 9 per cent retouch flakes, 8 per cent tabular flakes and 6 per cent lamellar flakes. The definitions of these terms are those of White.[2] No prepared cores were found; however, at least one projectile point and several lamellar flakes were noted which were probably struck from such cores. An examination of the flakes revealed no evidence of the bipolar technique of chipping in any part of the site.

It should be noted that in all probability the low percentage of secondary chippage relative to decortication chippage was due not to the activities of the aboriginal inhabitants but to the excava-

[2] White, Anta M., "Analytic Description of the Chipped-Stone Industry from Snyders Site Calhoun County, Illinois," in *Miscellaneous Studies in Typology and Classification* (University of Michigan Museum of Anthropology, *Anthropological Papers,* No. 19, Ann Arbor, 1963), pp. 9-18.

tion procedures. Fine screening would have been virtually impossible at the Bowen Site due to the extremely sticky nature of the soil, and thus much of the small chippage was regretably unrecoverable.

The following is a list of the kinds and numbers of chipped stone artifacts. There were 224 in all.

39 complete unnotched triangular projectile points
67 basal fragments of unnotched triangular projectile points
16 projectile point tips, hafting attributes unknown
6 triangular unnotched knives
1 pentagonal unnotched knife
2 stemmed projectile points
42 blanks
15 "T" or expanded base drills
5 drill tips without base
2 "tear drop" gravers
26 utilized lamellar flake scrapers
1 semi-lunar flake scraper
1 slate slab chipped edge scraper
1 large core of high iron content and handaxe-like form

The unnotched triangular projectile points constituted 48 per cent of the total chipped stone artifacts. If the broken tips were included as unnotched points, the percentage became 54. The tips were undoubtedly from such points since they conformed in every way to the tips of the whole unnotched triangular points and are very unlike the tips of the other types. The triangular unnotched type was further subdivided into groups on the basis of lateral and basal geometric attributes as defined by Binford.[3] The following table summarizes the relationships between these attributes for the points complete enough to permit observation of side and base.

TABLE 2. *Relationships of Lateral and Basal Elements of Unnotched Triangular Projectile Points*

	Straight sided	*Incurvate*	*Ovate*
Straight base	39	9	15
Subconvex base	9	9	15
Subconcave base	3	4	3

[3] Binford, Lewis R., "A Proposed Attribute List for the Description and Classification of Projectile Points," in *ibid.*, pp. 200-208.

TABLE 3. *Metric Data for all Measurable Triangular Unnotched Projectile Points*

	Length	*Width*	*Thickness*
Range	23-40 mm.	10-18 mm.	2-6 mm.
Mean	29.3 mm.	14.4 mm.	3.4 mm.
S/D	5.4 mm.	2.4 mm.	1.4 mm.
Mode	29 mm.	15 mm.	3 mm.

The standard deviation (S/D) is a measure of dispersion. With a normal bell-shaped distribution, about 68 per cent of the observations should fall within the range of the mean plus or minus one standard deviation. Thus, for the data shown in Table 3, 68 per cent of points should be between 23.9 mm. and 34.7 mm. long. If the range is extended to two standard deviations, 95 per cent of the observations will be included.

There was one small unnotched point with straight base and one side convex with the other concave. It measured 23 mm. by 12 mm. by 2 mm.

There were seven bifacially retouched points of a size to be considered as either spear points or knives. Six of these were straight sided, straight based, triangular, and unnotched.

TABLE 4. *Metric Data for Straight-Sided, Straight-Based, Triangular Unnotched Knives or Spear Points*

	Length	*Width*	*Thickness*
Range	73-87 mm.	35-47 mm.	4-13 mm.
Mean	82.3 mm.	38.0 mm.	7.1 mm.

The remaining blade was a pentagonal, unnotched form, 64 mm. long, 32 mm. wide, and 14 mm. thick.

There were two stemmed points excavated at the Bowen Site. Both were similar in size and shape. They were basically straight-sided triangular bodies with a stem which was broader at the base than at the point of attachment to the body. The measurements

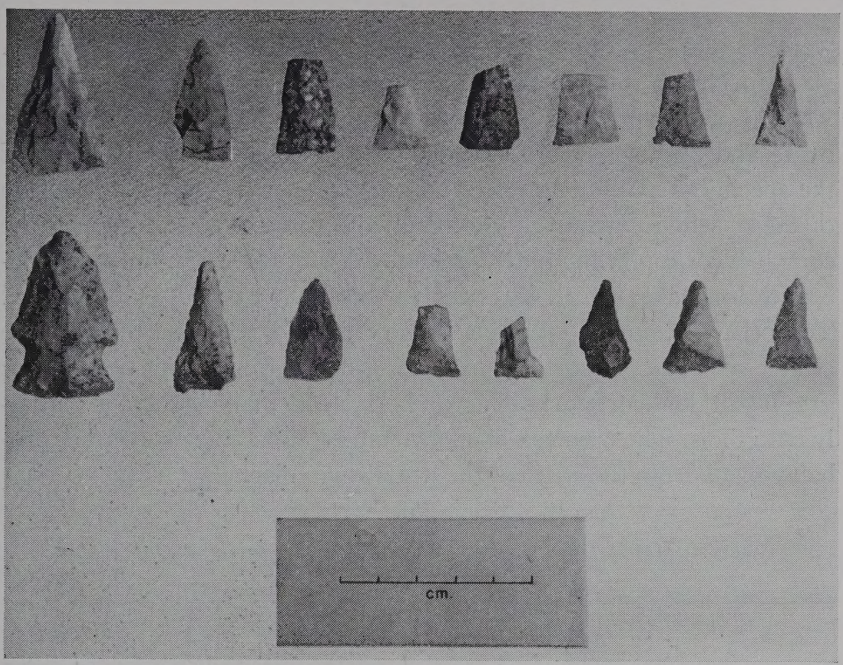

Plate III. Projectile Points from Bowen Site

Plate IV. Projectile Points from Bosson Site

were 38 mm. x 25 mm. x 6 mm. and 37 mm. x 26 mm. x 5 mm.

Forty-two roughly flaked, unfinished projectile points or blanks were also recovered. The shape of these specimens was essentially ovate and excurvate with straight or convex bases. Twenty-four of the specimens showed traces of the original pebble cortex and twelve of these, while extensively flaked on the inner surface, retained the complete cortex on the outer surface. Those twelve were primary decortication flakes which had been further flaked on only one surface. Ten other specimens retaining some evidence of the cortex were clearly secondary decortication flakes, and the remaining two of this group still had cortex showing on both sides, making them essentially core tools. The eighteen blanks which retained no cortex were probably made from the cores of the usual small glacial pebbles.

TABLE 5. *Metric Data for Unfinished Projectile Points and/or Blanks*

	Length	*Width*	*Thickness*
Range	30-40 mm.	20-28 mm.	7-12 mm.
Mean	33.3 mm.	22.2 mm.	8.3 mm.
S/D	4.2 mm.	3.3 mm.	2.2 mm.
Mode	30.0 mm.	20 mm.	7 mm.

The gravers were shaped like a teardrop and worked to a fine point. Only two were found, one (27 mm. x 18 mm. x 5 mm.) in Feature 51 and the other (26 mm. x 16 mm. x 6 mm.) in Block 127.

Drills were the expanded base or T type with a rather rounded cross-section for the shaft of the point. All fifteen complete specimens were similar to the triangular unnotched projectile points. The only real difference was the extremely concave nature of the lateral edges of the drills. John Witthoft suggested, in remarks to the Southeastern Archaeological Conference held in Knoxville, Tennessee, in November, 1968, that drills might be the result of continual resharpening of the edges of a projectile point until only the drill-like form was left. If such was the case, inter-

mediate forms should have been noted. While there were some points with slightly concave lateral edges, they did not seem to grade into the pronounced kind of concavity found on the drills. Five relatively narrow, parallel sided, round in cross section tips were termed drill tips.

TABLE 6. *Metric Data for Drills*

	Length	*Width*	*Thickness*
Range	22-24 mm.	11-25 mm.	2-6 mm.
Mean	31 mm.	14.3 mm.	3.9 mm.
S/D	5.2 mm.	3.5 mm.	1.3 mm.
Mode	30 mm.	13 mm.	3 mm.

Only twenty-seven scrapers were identified from the Bowen Site. Of these, twenty-six were lamellar flakes which had been used briefly and then discarded. All twenty-six showed a minimum of secondary flaking along one or two edges and none seemed to have been purposefully shaped in any manner. One scraper was slightly different in form, although possibly this was due only to the form of the flake. It had the appearance of a tiny, semilunar knife with one side straight and the other markedly convex. Only the convex side was secondarily chipped, probably from utilization.

One artifact was a slate slab, rectangular, 11 centimeters by 7 centimeters by 1 centimeter. One of the 7 centimeter edges was beveled by purposeful chipping. Only the smallest secondary chipping was present on the beveled edge. This suggests that the tool was little used but possibly as a scraper. Indeed, the maker may have had another purpose altogether but never finished or used the tool.

A large piece of stone which at first was thought to be meteoric iron was found in Feature 10. Additional examination revealed that the piece was chert with a very high iron content, giving it a rusty look and high density, but not as high as iron. It was heavily worked and had an appearance similar to a handaxe. Large flakes were removed from both sides and the edges roughly

defined. No secondary chipping was discerned. It measured 13 cm. by 9 cm. by 3 cm. and was slightly more pointed on one end than on the other. William H. Blackburn, of the University of Kentucky Geology Department, analyzed the stone and suggested that Minnesota was the likely original source for it.

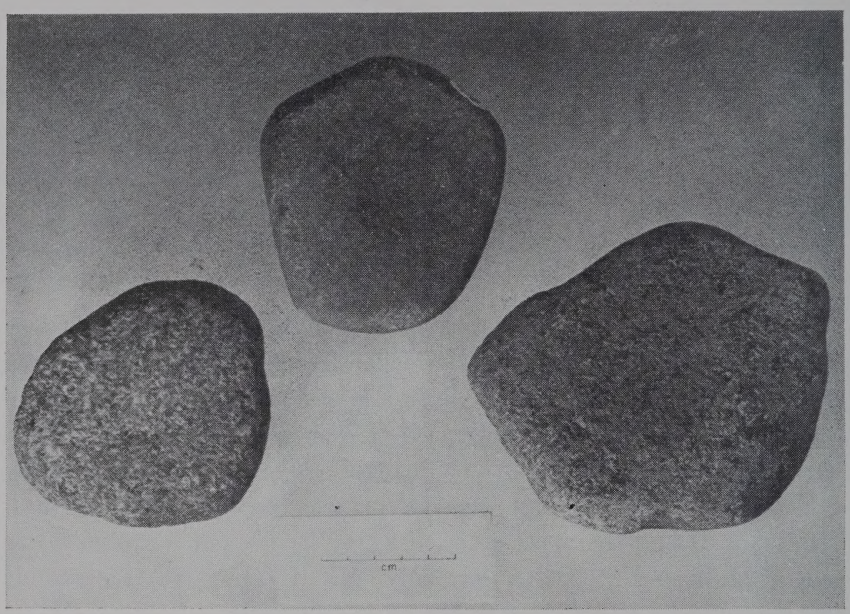

Plate V. Manos from Bowen Site

Ground Stone

Roughly half (fifty-four) of the 105 ground stone artifacts were grinders with faceted surfaces. Primarily on the basis of size, six large stones ground flat or slightly concave on both plane surfaces were designated metates and forty-eight much smaller stones were classed as manos. The metates were approximately 25 to 30 centimeters in diameter, 7 to 9 centimeters in thickness, and had irregularly shaped outlines. The manos were generally much smaller, roughly 10 to 15 centimeters in diameter and 5 to 7 centimeters in thickness. Although sometimes ground on two surfaces, they were usually ground on only one.

Thirty of the forty-eight manos had been reused as another tool. Seventeen had been used as an anvil or platform against which other stone objects were struck or placed to be struck. One was heavily battered at one end indicating additional use as a hammerstone, while twelve others had been reused as both anvil and hammerstone.

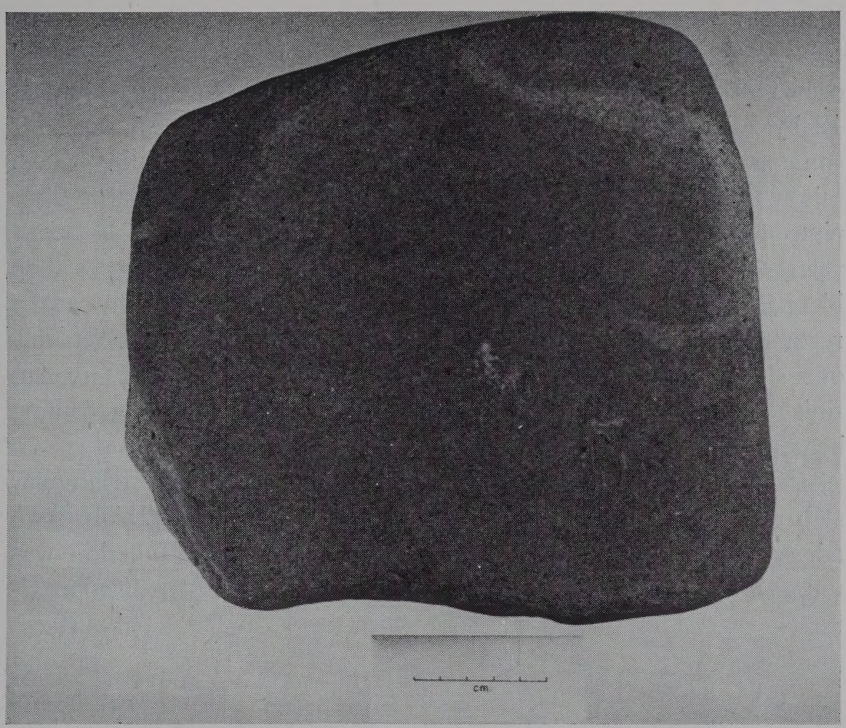

Plate VI. Metate from Bowen Site

Sixteen stones of approximately the same size as the manos had been employed as anvils exclusively. In addition, there were thirteen hammerstones of varying sizes and shapes. Except for composition, the only thing all had in common was a battered edge somewhere on the stone. One hammerstone had a unique shape which may classify it as a specialized implement. It was of limestone, perfectly spherical, 7 centimeters in diameter, and battered in a number of places.

There were seven celts, including a miniature one. Materials used to make the celts were micaceous stones except for one made of limestone. The latter had been burned and was very soft and powdery.

There were nine small pieces of amorphous sandstone with one or more grooves worn in them by use as abraders. None was larger than 5 by 3 by 1 centimeters.

The remaining six ground stone artifacts were one-of-a-kind occurrences. There was a rectangular slab of sandstone roughly 12 by 7 by 1 centimeters which seemed to have been prepared for some specific purpose but showed no sign of wear or staining which might give a clue to its use. Next was a fragment of a banded-slate pipe stem. The stem was broken longitudinally as well as transversely leaving only a small portion of the original object; thus identification is somewhat open to doubt. The third item was a rectangular gorget of slate. The single hole was drilled from only one side. The fourth item was particularly disconcerting, an unfinished prismatic-shaped bannerstone, which had the hole drilling begun but not completed. It was of quartzite.

The last two items were of hematite, the first a triangular slab roughly 7 centimeters on a side and 5 millimeters thick. Two edges had been ground to a beveled appearance, but function was unknown. The other piece of hematite was a small lump approximately one centimeter in diameter, with three small faceted surfaces ground on it.

The bannerstone, possible pipe fragment, and gorget were all from the plough zone and thus cannot be shown to have any positive relationship to the other materials and features of the site. There is a strong possibility that they were found elsewhere and picked up and brought to the Bowen Site by its inhabitants. The bannerstone was the only indication of a possibly earlier cultural stratum but by itself provided little support for a prior occupation.

Miscellaneous Materials

Although only fifty-two fragments of burned stone appear in

the tally made in the laboratory, it was known that hundreds more were excavated, examined in the field to determine if they were worked, and discarded if they were not. Usually no count was made of those discarded but mention of concentrations was made in the field notes. Thus the fifty-two fragments did not truly indicate how many such fragments there were. In addition to the category of burned rocks, there was a separate one of burned limestone fragments, since the latter were very distinctive in their powdery white appearance. They totaled thirty-one.

Four small discs cut from mussel shell were found. They ranged in diameter from 12 to 20 millimeters. All were unperforated and of unknown use.

There were six lumps of burned clay recovered, but none bore evidence of being used for daub or any other known purpose. It is probable that they were simply parts of fire basins which were scraped into refuse pits or were products of some equally fortuitous circumstance.

The final artifactual class consisted of two very small, very thin, pieces of copper. They were irregularly shaped, but generally less than a centimeter in diameter, and had the approximate thickness of 20-pound typing paper. There was no context for either piece.

Unmodified Bone, Antler, Stone, Shell, and Clay

The large quantities of unmodified bone, antler, stone, and shell are listed in Table 7. Nearly all are discussed under other headings and need no further comment here. As was noted, the bulk of the unmodified stone reflected an origin in areas other than central Indiana. However, that alone did not indicate trade relations since glacial transportation would account for most of it. The micaceous rock, hematite, quartz, gneiss, and limonite particularly reflected the makeup of bedrock materials to the northeast, the direction from which the Erie Lobe of the Wisconsin Glaciation came.

A single mud dauber's nest was found at the 2.4 to 2.8-foot level of Feature 46. Mud daubers frequently built their nests in

the eaves of Mississippian houses but since no sign of structures was found at the Bowen Site, that could not have been the source of the nest.

TABLE 7. *Unmodified Bone, Antler, Stone, Shell, and Clay*

Bone:		Stone:	
Identified as to species	7500+	Micaceous rocks and fragments	104
Unidentified	3500+	Hematite	22
Antler:		Quartzite	5
Complete	6	Gneiss	5
Fragments	50	Sandstone	6
Shell:		Limestone	3
Mussel	4561	Slate	5
Aquatic snail	188	Shale	6
Terrestrial snail	413	Horn coral	1
Clay:		Petrified wood	2
Mud daubers nest	1	Marble	3
		Limonite	2
		Mudstone	2
		Concretion	2
		Undifferentiated	122

POTTERY

The pottery type is conceived of as being broadly or narrowly inclusive, of short or long duration, and of wide or restricted distribution, depending upon the criteria used to define it. It is a created unit of the ceramic continuum and is to be used for answering questions, not defended as the static creation of a particular archaeology. Implicit in the typological concept, however, is the idea that a type should have a consistency about it that will permit relating of types to broader units of the ceramic continuum. At the same time, when a number of related types can be shown to have the same temporal-spacial distribution, they can be considered a single type. Conversely, when varieties of a type can be shown to operate independently, one from the other, in terms of time and space, it is confusing to continue treating them as a single type. Further, it masks relationships which may be useful in the writing

of culture history. The archaeologist is, thus, always caught by the problem of not knowing initially what the culturally meaningful attributes of any ceramic assemblage are, and, ultimately, must fall back on a kind of trial and error procedure which consists of a categorizing, testing the categories in terms of time and space, and recategorizing where necessary.[4]

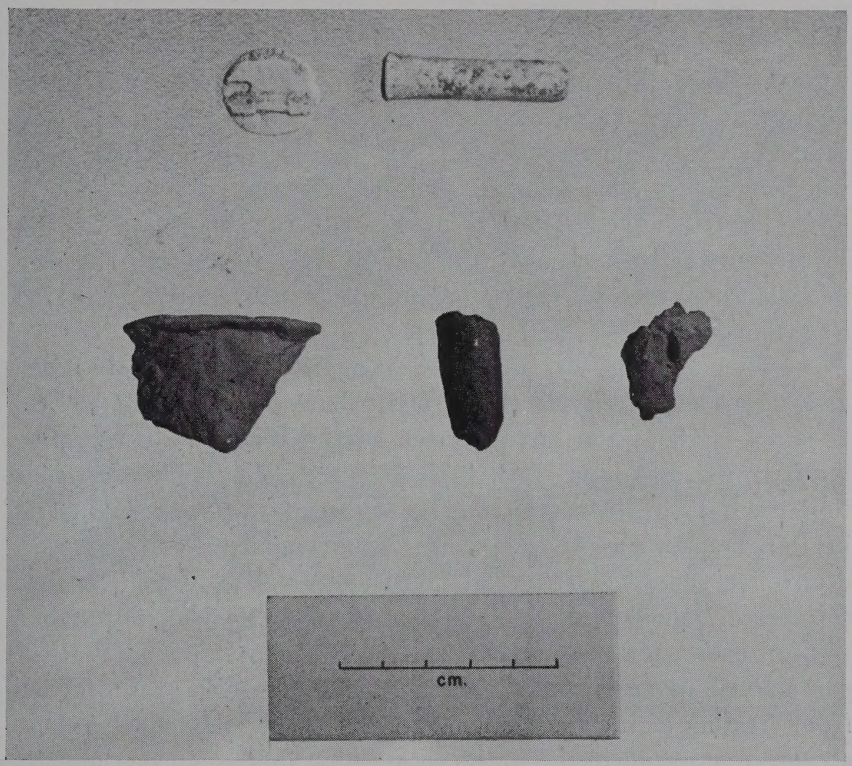

Plate VII. Shell Disc, Polished Bone, Rim Section of Miniature Vessel, and Two Pipes from Bowen Site

[4] Phillips, Philip, James A. Ford, and James B. Griffin, *Archaeological Survey in the Lower Mississippi Alluvial Valley, 1940-1947* (Peabody Museum of American Archaeology and Ethnology, *Papers,* XXV, Harvard University, Cambridge, Mass., 1951), pp. 63-64; Dorwin, John T, Archaeological Salvage of the Yankeetown Site (National Park Service Report on file at Northeast Region Office, Philadelphia, 1968), p. 41.

It is precisely in this area of categorizing and recategorizing that so much of an archaeologist's time is spent. The traditional "eye-balling" of materials laid out on long tables and the moving of them from one category to another each time a new set of criteria is employed is very time consuming. Such practices can be greatly shortened by the use of any of a number of information storage and retrieval systems.

The following is a step-by-step description of what was done with the Bowen Site material in order to arrive at the point where a high-speed sorter and a computer could be used to categorize and recategorize the materials at will and print the results in a form which could be used in a number of different ways.

The pottery collection from Bowen Site numbered 29,786 sherds. It was broken down into 24,766 body, 4,919 rim, and 101 miscellaneous sherds. The latter included such things as sherds from miniature vessels and clay pipes.

Initial analysis was made using approximately 5,000 sherds as a means of identifying the basic attributes: kind of sherd (rim, body, or rim-body juncture), temper, surface treatment, rim profile, lip form, rim additions (fold, strip, or extrusion), handles, castellation, decorative motifs. On the basis of the information accumulated in this manner, a checklist form was compiled to be used in describing sherds quickly and consistently.[5] The form was not considered a mold into which all sherds would then fit, but rather as open ended and expandable. As was anticipated, there were a considerable number of additions made to the form in order to keep from creating artificially similar descriptions of, in fact, dissimilar sherds. For example, the form[6] shows each of the various everted rim groupings with a total of six kinds of lips; however, in the final total there were eleven kinds. Five categories were added as they were needed.

When all the information was assembled on the forms and all sherds had been examined and described, the next step was to

[5] See below pp. 404-406.

[6] See below p. 405.

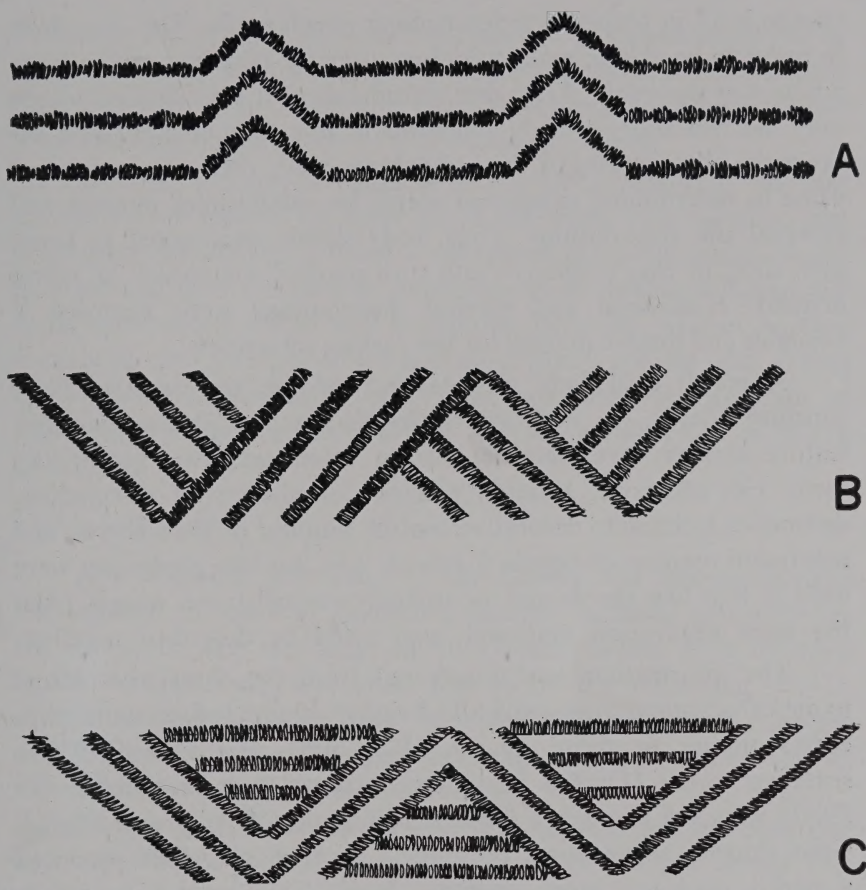

FIG. 3. OLIVER PHASE DECORATIVE MOTIFS: *a* horizontal rows of close-set cord impressions; *b* oblique lines of cord impressions; *c* alternating chevron and horizontal lines of cord impressions

encode it all in preparation for making punch cards. This was done in order to be able to make use of a sorter for handling such a large amount of material. After due consideration it was decided to use only the rim and rim-body junctures in this computer analysis because the homogeneity of the body sherds made them of no apparent value in determining categories useful for establishing internal and external site relationships. Thus, body sherds were noted as being grit, shell, or clay tempered; and cord marked, smoothed, or fabric marked. Horizontal and vertical distributions were recorded if available and totals compiled for the various categories.

A punch card code was devised for the rim and rim-body juncture sherds. It included catalogue number, excavation unit, feature number, level, temper, surface treatment, rim profile, lip form, rim additions, handles, presence or absence of castellation, decorative technique, decorative motifs, number of such sherds and maximum number of vessels involved. The last two categories were used so that like sherds and/or partially reconstructed vessels from the same excavation unit and level could be described together.

The information was transferred from the descriptive forms to optical scanning forms which had eighty columns of ten units each, corresponding to those of the IBM 5081 punch card. These scanning forms (Optical Scanning Corporation form number DS 2970) were fed through a Digitek 100 Optical Reader and Digitek Card Punch (also Optical Scanning Corporation) which produced a punch card for every scanning form. This proved to be an economical method of punching both in terms of time and money. Use of professional key punch operators would have cost about $250.00, including validation, and would have necessitated first transferring the data to coding sheets from which the operator must work. The scanning forms could be marked with a pencil at the rate of approximately fifty forms an hour after only a few hours, as familiarity with the code increased. Some sixty to seventy man hours were actually spent marking scanning forms. Validation proceeded at the same time by simply double checking with very little loss of time. The entire set of approximately 2,800 scanning forms

was converted to punch cards in less than two and a half hours. Total cost was $35.00 exclusive of a figure for the writer's time. In any case, this part of the operation could have been done by unskilled labor and need not have taken the archaeologist's time.

Initially, the punch cards were sorted mechanically so that all sherds with exactly the same set of attributes were together, and a program written to provide a computer print-out which would separate and total the various combinations of attributes. Later, the cards were again sorted and a printing program written so that excavation unit and/or feature was the primary sorting unit, giving the horizontal distribution of various attributes. At the rate of 1,200 cards a minute, such sorting was not as laborious as might be expected.

Full-Size Pottery

The following description of the Bowen Site full-size pottery (as opposed to small or miniature vessels) is based primarily on the 4,375 rim and rim-body juncture sherds which were included in the sorting study, and much less so on the remaining 25,411 sherds. Among the latter there were 2,208 for which only temper and rim-body distinctions were available. These are referred to throughout as undifferentiated sherds.

Temper and surface treatment were summarized for both rim and body sherds in Table 8. The total of 29,538 grit versus 147 shell-tempered sherds and four non-tempered sherds clearly showed an overwhelming preference for the former.

There was a marked disconformity between rim and body sherds in terms of surface treatments. Excluding the undifferentiated materials, cord marking accounted for 93.1 per cent of the body sherds but only 15.5 per cent of the rims. Similarly, fabric marking accounted for 5.1 per cent of the body sherds but only 1.3 per cent of the rims. The reverse situation occurred, however, with smoothed sherds. Only 1.8 per cent of the body sherds were smoothed, while 83.1 per cent of the rims were smoothed. Clearly, smoothing was usually done only to the rim of a vessel. Since decoration was

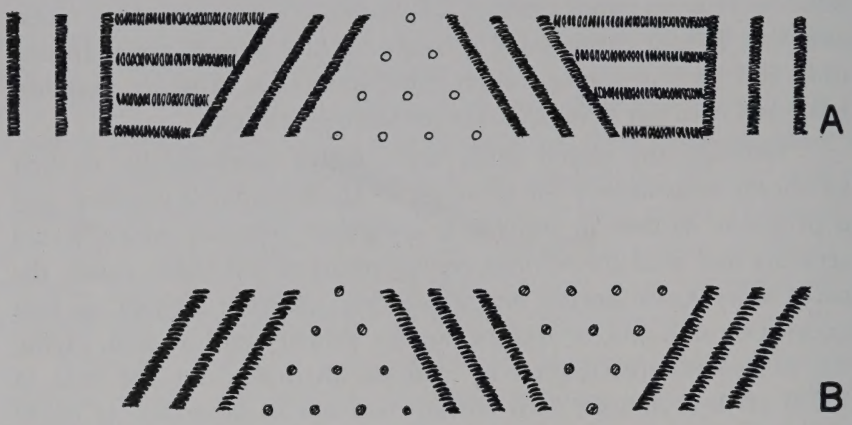

FIG. 4. OLIVER PHASE DECORATIVE MOTIF: vertical and horizontal cord impressions alternating with circular punctates

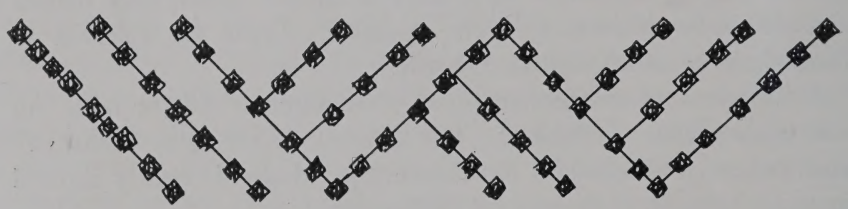

FIG. 5. OLIVER PHASE DECORATIVE MOTIF: short cord impressions set apart in obliquely alternating rows

limited to the rim and lip areas, it might be argued that smoothing was in preparation for decoration. Indeed, when cord marking was plotted against rim decoration and lack of rim decoration, there were 120 decorated cord-marked rims and 561 cord-marked undecorated rims. The same was true with fabric-marked rims where fifty-two were undecorated and six were decorated. However, since 2,307 or 63.4 per cent of the 3,636 smoothed rims were undecorated, it does not follow that smoothing was necessarily succeeded by decoration.

The rim profiles were: sharply everted with the outside angle of the rim-body juncture 90° or less; moderately everted with rim-body juncture rounded and more than a 90° angle but less than 150°; slightly everted to straight with no clear rim-body juncture; thickened collared rim; and cambered-collared rim. Table 9 summarizes the numbers and percentages of each kind of rim profile.

There were ten different kinds of lips plus an eleventh category of lip missing. The first four (rounded, flattened, beveled, and rolled) had to do with form only, while the next six were altered by what might be termed decorative techniques, into different forms. These included four kinds involving cord impressions: scalloped, notched, channeled, and transverse oblique. These impressions were made with the edge of a cord-wrapped paddle or dowel and in some cases simply by a single twisted strand of cord. The ninth kind was notching by incision rather than impression and the tenth was channeling by punch and drag. If the lip was missing, no hole was punched. Lip form is summarized in Table 10.

Rim form is here intended to indicate the presence or absence of a rim fold, rim strip or extruded rim. There were 371 sherds with rim folds, 482 sherds with rim strips, 4 extruded rims, 1,533 plain rims, and 1,989 from which the lip and upper rim area were missing, precluding examination for this attribute. If only sherds with lips were included, 853 out of 2,386 or 35.8 per cent had either folds or strips.

TABLE 8. *Temper and Surface Treatment*

BODY SHERDS

	Cord marked	*Smoothed*	*Fabric*	*Undifferentiated*	*Totals*
Grit	21,485	332	1,182	1,650	24,649
Shell	20	79	4	14	117
Totals	21,505	411	1,186	1,664	24,766

RIM SHERDS

	Cord marked	*Smoothed*	*Fabric*	*Undifferentiated*	*Totals*
Grit	672	3,619	58	540	4,889
Shell	9	17	0	4	30
Totals	681	3,636	58	544	4,919

Net Total 29,685

SMALL AND MINIATURE VESSELS, PIPES, HANDLES, AND DRILLED

	Small Vessels	*Miniature Vessels*	*Pipes*	*Handles*	*Drilled*	*Totals*
Grit	42	23	13	17	2	97
None	0	3	1	0	0	4
Totals	42	26	14	17	2	101

Grand Total 29,786

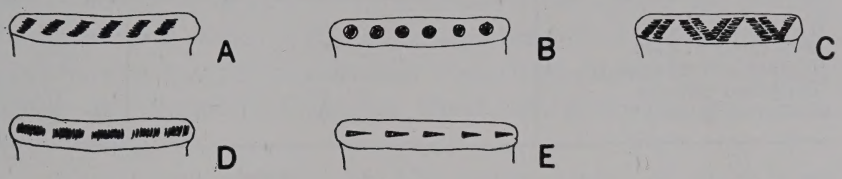

FIG. 6. OLIVER PHASE DECORATIVE MOTIFS, Lip Decorations: *a* transverse impressed; *b* channeled; *c* transverse impressed; *d* channeled; *e* channeled

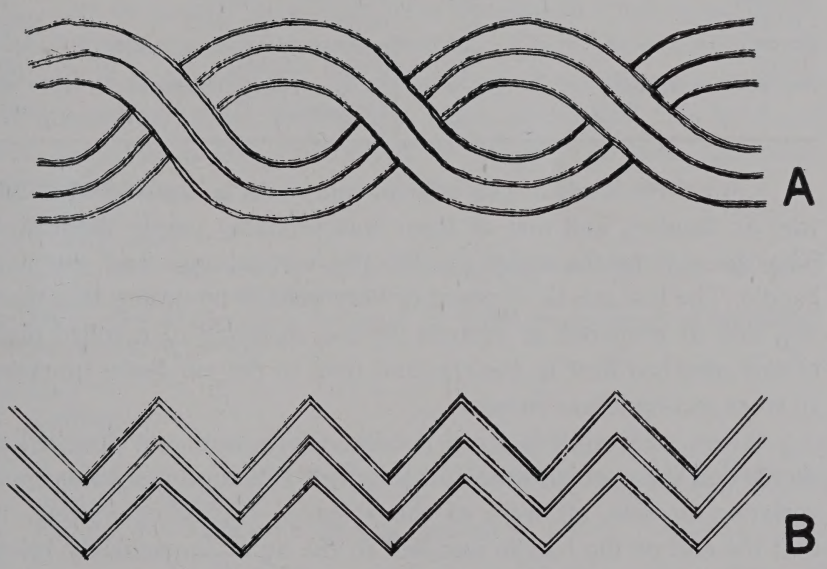

FIG. 7. OLIVER PHASE DECORATIVE TECHNIQUES: *a* trailed curvilinear guilloche; *b* trailed zigzag

TABLE 9. *Rim Profiles*

	Number	*Percentage*
Sharply everted	168	3.8
Moderately everted	841	19.2
Slightly everted-straight	3,094	70.7
Thickened collared	82	1.9
Cambered collared	190	4.3

TABLE 10. *Lip Forms*

	Number		*Number*
Rounded	653	Impressed notching	3
Flattened	817	Impressed channeled	350
Beveled	138	Impressed transverse oblique	317
Rolled	31	Incised notching	40
Impressed scalloped	4	Drag and punch channeled	29
		Lip missing	1,989

Only three kinds of rim attachments could be considered in any way as handles, and one of them was probably purely decorative. The three were the strap handle, the vertical lug, and the loop handle. The last can be disposed of very quickly by noting that there was one. It occurred in Feature 92 and consisted of a rolled piece of clay attached first to the rim and then to the rim-body juncture. In cross section it was circular.

There were sixteen strap handles which were not attached to sherds and sixty which were still attached. Although there was some variation in size, all were of the so-called expanding variety, in that the end of the handle attached to the lip or immediately below the lip of a vessel was approximately twice as wide as the end attached lower down the vessel wall. There was, of course, considerable flattening of the handle giving rise to the strap handle appellation. All strap handles were grit tempered and smooth. Only three were decorated and in each case the decoration was simply part of the general trailed-line design of the vessel.

The last type of "handle" was probably only decorative in nature. On 37.9 per cent of the S-cambered rim sherds there were lugs which were vertically placed and either pinched up out of the vessel surface while still wet or attached to the surface and pinched into the same shape. There were anywhere from six to fourteen such vertical lugs per vessel, either counted or calculated from large sherds and reconstructed vessels. Decoration frequently was placed over the lugs.

Castellations occurred on 120 sherds, ninety of which were decorated. Eighty-four of the latter were decorated with cord-impressed designs, while two had circular and four had linear punctates. Nearly always the lip of such sherds was also cord impressed, either transversely or channeled.

The decorative techniques were reduced to three basic kinds: cord impressing, incising, and punching. There were a number of variants of each, however. In the analysis it was found convenient to differentiate these, particularly when more than one technique was involved on the same sherd or vessel. The nine decorative techniques were:

Cord impressing
1. Short cord impressions set so closely together that they appeared to be a continuous impression
2. Short cord impressions set apart so that they appeared as individual segments of a row

Incising
3. Trailing
4. Trailing with the upper edge of the rim, rim strip, or rim fold gashed obliquely with a short, broad implement, possibly finger or thumb impressions
5. Trailing combined with circular punctates
6. Fine-line incising

Punching
7. Punching with circular punctates
8. Punching with linear punctates
9. Punch and drag

An initial attempt was made to isolate motifs which were common to various techniques. Thus, for example, a basic similarity

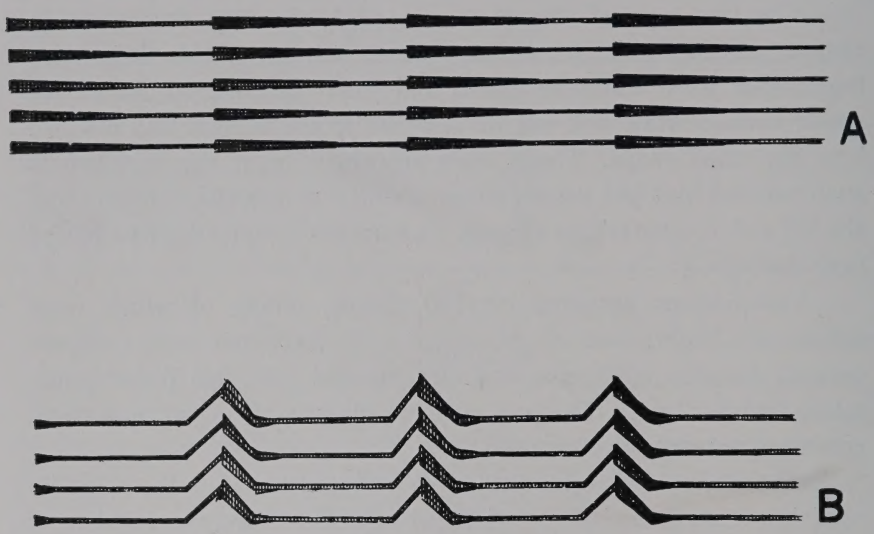

FIG. 8. OLIVER PHASE DECORATIVE TECHNIQUE AND MOTIF: punch and drag horizontal lines

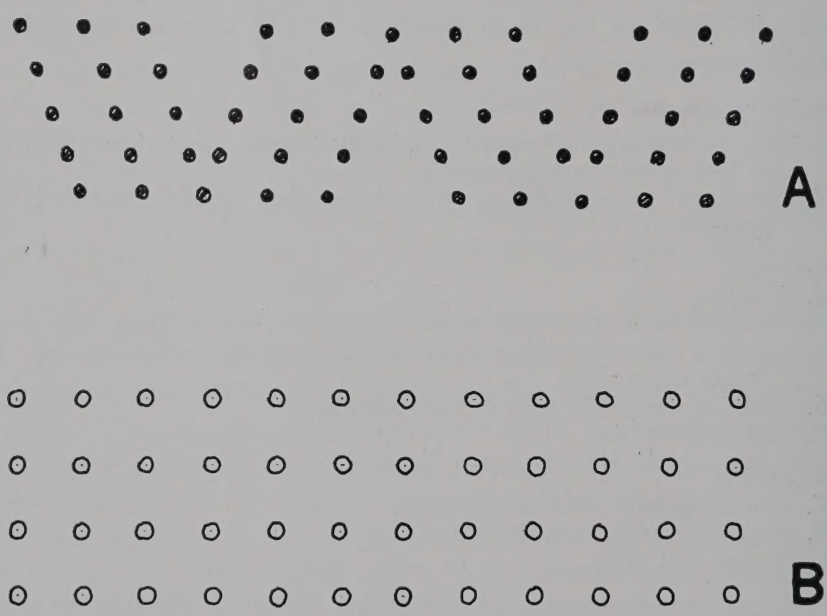

FIG. 9. OLIVER PHASE DECORATIVE TECHNIQUES AND MOTIFS: *a* circular punctate chevrons; *b* circular punctate horizontal lines

was recognized if a chevron design was made with linear punctates or with cord impressions, or the curvilinear and rectilinear guilloches with trailed or fine-line incising. Others were unique designs with specific techniques and necessitated separate categories. The complete list of twenty-seven motifs is given below, pp. 394-95.

Small Vessels, Miniature Vessels, and Pipes

Many sherds which belong to this category were doubtlessly lost in the total analysis, particularly if they were too small to display their characteristically tight curvature. This fact renders any statistical treatment invalid from the outset, leaving us simply to describe and to consider the fragments for positive implications of association with other artifacts, features, burials, or structures. Nothing could be made of negative distribution since absence of the items in this case might only have been due to failure to identify materials so difficult to differentiate. It is probable that only a small proportion of the real total was recognized.

A small vessel was considered one with an orifice 8 to 12 centimeters in diameter and a height of less than 12 centimeters. It was usually rather thick walled, approaching 10 millimeters.

A miniature vessel was one with an orifice 3 to 5 centimeters in diameter and a height of less than 6 centimeters. These were always very crudely done, occasionally with small finger prints still showing in the baked clay. Walls were 9 to 15 millimeters thick.

Pipe-bowl fragments were identified primarily on the basis of the extremely small diameter evidenced by the curvature, the thinness of the wall, and far greater smoothness and quality than were found in the miniature vessels. Curvature indicated that most of the bowls would have been 3 or less centimeters in diameter. Thickness of pipe bowls was 4 to 7 millimeters as contrasted with the 9 to 15 millimeters thickness of miniature and small vessels.

All small vessel sherds were grit tempered, as were most of those from miniature vessels and pipe bowls. The four sherds which were not grit tempered had no discernable temper at all. Of these,

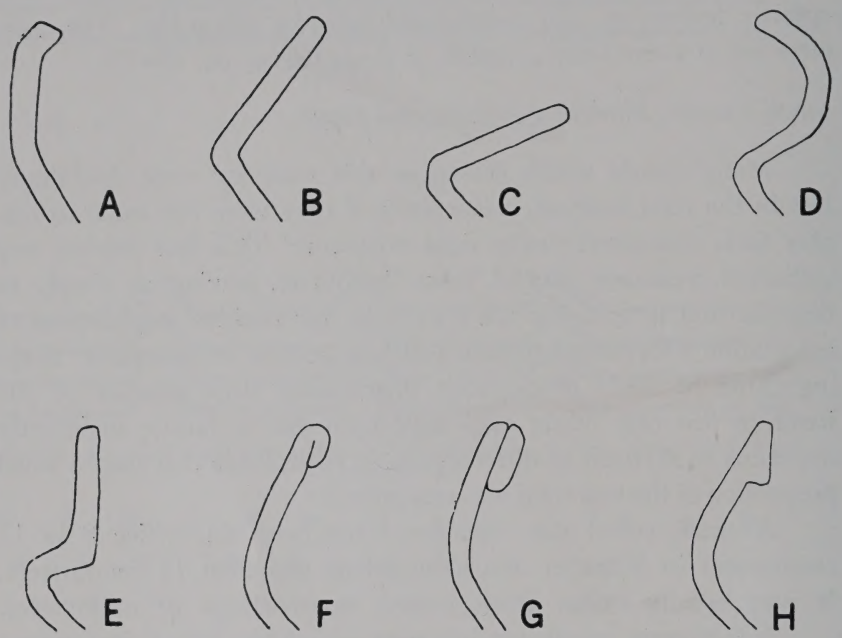

FIG. 10. OLIVER PHASE RIM PROFILES: *a* slightly everted; *b* moderately everted; *c* sharply everted; *d* cambered collared; *e* straight collared; *f* rim fold; *g* rim strip; *h* extended rim

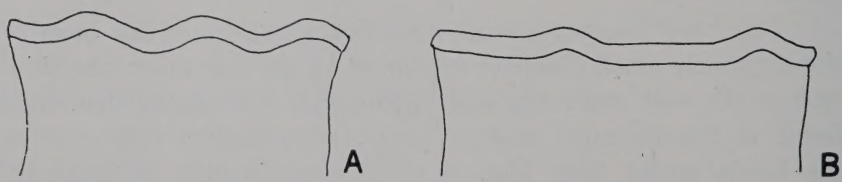

FIG. 11. OLIVER PHASE SCALLOPED RIM AND CASTELLATED RIM

three were from miniature vessels and one was from a pipe bowl.

There was little conformity to the attribute list assembled for the full-size pottery. Nearly all small and miniature vessels had incurving rim profiles. Nearly all were round-bottomed pots with essentially straight walls which curved slightly inward at the top. Those which did not curve inward had a straight profile. Decoration of small and miniature vessels consisted principally of fine-line-incised curvilinear guilloches and pie-crust kind of pinching of inward curving rims. Perhaps these were the products of children learning the art of pottery making by experience. This was particularly suggested by the tiny finger and thumb prints of the pinched rims.

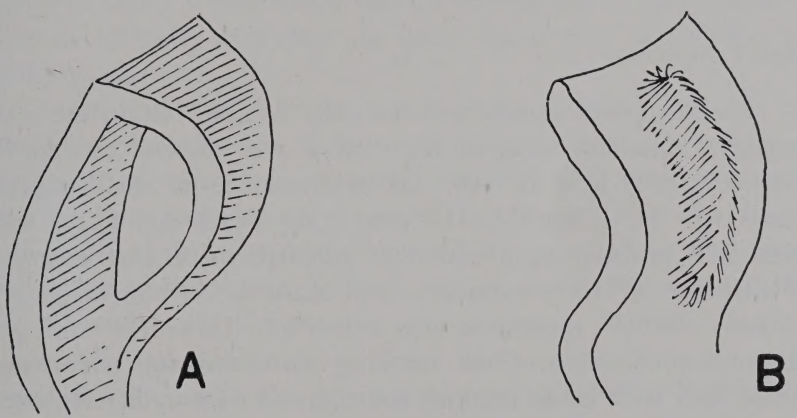

Fig. 12. Oliver Phase Strap Handle and Lug

Most of the pipe-bowl fragments had no evidence of the form of the remainder of the pipe. However, the four which did were parts of elbow pipes. There were also two clay, tubelike objects which were broken off at one end. These were probably pipe stems. Only two of the pipe-bowl fragments showed any sign of burning on the interior.

Table 11 indicates the number of sherds from small vessels, miniature vessels, and pipes, as well as the maximum possible number of vessels or pipes involved in each category.

TABLE 11. *Sherds From Less Than Full-Size Vessels*

	Number of Sherds	*Maximum vessels*
Small vessel sherds	42	from 26 vessels
Miniature vessel sherds	26	from 21 vessels
Pipe bowl sherds	11	from 11 pipes
Pipe stems	2	from 2 pipes

Attempted Repairs

Two grit-tempered cord-marked body sherds were found which had been drilled and then had broken through the hole. They were from different vessels and probably indicated attempted repairs to the pots of which they had been a part.

Shell Tempering

Shell-tempered sherds were partially handled within the main corpus of data but were so few that it was decided to describe them separately here as well. The total number of shell-tempered sherds was 147. Of these, 117 were body sherds and thirty were rims. It is probably significant that although there were examples of all three surface treatments—cord marked, smooth, and fabric marked—the bulk, ninety-six, were smoothed. This reverses the grit tempered proportions. Cord marking accounted for twenty-nine sherds, four were fabric marked, and eighteen were undifferentiated.

Four of the thirty rim sherds were undifferentiated while seventeen were smoothed and nine were cord marked. All nine cord-marked sherds were from the same vessel, which is shown in Plate XXI. Of the seventeen smoothed rim sherds, ten were decorated and seven undecorated. Eight of the decorated rims had curvilinear guilloches and the remaining two were cord impressed. Thus, the entire shell-tempered assemblage was exceedingly small (.05 per cent of the total) and fit very comfortably within the typology devised for the grit-tempered materials.

Discussion

Of considerable value at this point was the study of the Oliver Site pottery.[7] In order to sort the punch cards in a way which would give the most meaningful differentiation it was necessary first to have some idea of what the most powerful attributes might be. In other words, was variation in temper as distinctive of particular relationships as decorative techniques?

Such attributes as castellations and handles are too intermittent in occurrence on a vessel to differentiate at the type level. That is, many rim sherds from a vessel with strap handles do not have any evidence of the handles and therefore would be classed separately. For this reason, both castellation and handles were deemed weak attributes. Later it was found that the two were mutually exclusive in terms of their occurrence on types which were established by other criteria.

Tempering was seen as crucial from the first, but not of immediate concern since the overwhelming bulk of the collection was grit tempered. As noted above, only 147 shell-tempered sherds were involved, and without exception they fit categories established on the basis of the grit-tempered material. Thus, in effect, tempering was treated in the general analysis as a powerful attribute and the shell-tempered material separated and handled as a distinct unit.

Surface treatment was generally of low power because most rims were smoothed, making it impossible to tell whether cord marking or fabric marking was involved. Where the sherd was large enough to include a portion of the body and surface treatment could be discerned, distinctions of cord marking and fabric marking were made. In the final analysis, a fabric-marked type was established to draw attention to the special relationships engendered. Rim forms were found to have distributions in which the rim strips and folds were exclusively associated with slightly everted to straight rims with either incised decoration or no decoration at all. Rims without strips or folds occurred occasionally with incised decoration but

[7] Helmen, Vernon R., "The Cultural Affiliations and Relationships of the Oliver Farm Site, Marion County, Indiana."

overwhelmingly with all other rim profiles and decorative techniques.

Lip treatment corresponded precisely with decorative techniques and was thus not considered a powerful attribute. That is, flattened rims were flattened by decoration. Thus, cord-impressed or punched decoration produced a flattened lip while incised decoration or no decoration left a rounded lip.

Decorative motif, while of some apparent value in the original selection of criteria, was not a particularly powerful attribute. As Table 12 shows, there was a clear distinction between the motifs executed by the incising technique (3, 4, 5, 9) and those done by cord impression or punctation (1, 2, and 6, 7, 8). (Motifs 17 and 18 were unknown categories and deceptive in this instance.) However, many motifs were executed by both cord impression and punctation, making motif good for only one kind of distinction and even that was already made by the decorative technique categories.

Ultimately it became clear that the distinctions to be made were going to have to be along the lines of decorative technique and rim profile. Tables 13 and 14 show the relationships between rim profile and decorative techniques. The Bowen Collared Rim type was delineated by the combination of collared rim and cord-impressed or punched designs. Two varieties of the type were differentiated by the cambered versus straight collar and by the much higher frequency of punched designs on the straight collars.

The Bowen Everted Rim type stands out clearly with its sharp rim-body juncture and total lack of decoration. While not shown on the tables, the Bowen Fabric-marked type had only slightly everted to straight rim profiles and was almost never decorated.

The remaining two types were principally delineated by decorative techniques. Bowen Cord-marked included all of the cord-impressed and punched decorated material of both moderately everted and slightly everted-straight rim profiles, while Oliver Cord-marked included all incised sherds of both kinds of profiles. In

TABLE 12. *Correlation of Decorative Techniques and Motifs*

Codes of Techniques and Motifs are found in the Appendix, pp. 394-95.

Techniques \ Motifs	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
0																												
1				24	87	33	6	95	75	16	79	31	2	9	18	10		28	1		3		1	2	1	1	2	1
2				1	8			7	11	10	21	21		5		2		4			3	6		2	1			
3	608	10	21															3	4		1							
4	11																	1										
5	14		2					1										7	3		2	1				1		
6					1			2	6	1	22	4			1	1		3			1							
7					2	10		6	14		21	18					1	4	1						1			
8				1		1	1	3	1	3		1		1	4		1	2								1		
9	2																		1	9								

TABLE 13. *Percentages Of Rim Profiles Decorated By Various Techniques*

	No Decoration	Cord Impressed	Punched	Incised	Totals
Cambered Collar	24 12.6%	148 77.9%	15 7.9%	3 1.6%	190
Straight Collar	6 7.3%	37 45.1%	38 46.3%	1 1.2%	82
Extremely Everted	166 100%	0 0	0 0	0 0	166
Moderately Everted	642 78.3%	111 13.5%	44 5.4%	44 5.4%	820
Slightly Everted-Straight	2,010 65.7%	331 10.8%	43 1.4%	675 22.1%	3,059

Top number in each block is frequency while bottom number indicates what percentage of the particular rim profile was decorated with the particular technique.

both types there were moderately everted and slightly everted-straight rim profiles. Very few moderately everted rims had incised decoration and so undecorated sherds of that profile were classed as a variety of the Bowen Cord-marked type. This made a total of three varieties included in it: Cord impressed, Punched, and Plain. The remaining undecorated slight-straight profile sherds were termed

TABLE 14. *Percentages Of Decorative Techniques Used On Various Rim Profiles*

	No Decoration	Cord Impressed	Punched	Incised
Cambered Collar	24 0.8%	148 23.6%	15 10.7%	3 0.4%
Straight Collar	6 0.2%	37 5.9%	38 27.1%	1 0.1%
Extremely Everted	166 5.8%	0 0	0 0	0 0
Moderately Everted	642 22.5%	111 17.7%	44 31.4%	23 3.3%
Slightly Everted-Straight	2,010 70.6%	331 52.8%	43 30.7%	675 96.2%
Totals	2,848	627	140	702

Top number in each block is frequency while bottom number indicates what percentage of the particular decorative technique was placed on the particular rim profile.

the Plain variety of the Oliver Cord-marked type as distinct from the Incised variety.

The following are the formal descriptions of the five pottery types including varieties:

Type and Variety Descriptions

OLIVER CORD-MARKED: INCISED VARIETY (1a)

Paste:

Method of manufacture: not known since no coil breaks were observed

Temper: Grit, primarily particles of decomposed micaceous rocks

Texture: Compact. Only a very few tempering particles protrude on the interior and exterior surfaces.

Hardness: Ranges from 2 to 3 but usually just below 2.5

Color: Buff to reddish brown, to brown to dark gray; core buff to reddish brown to light gray

Surface finish: The body is cord marked with the rim usually smoothed-over cord marking. Less than 1 per cent of this type have the rim cord marked. The interior is smooth.

Decoration: Limited to the rim and lip area. Trailed curvilinear and (rarely) rectilinear guilloche designs are executed in two- or three-line patterns. On six sherds the area within the eye of the guilloche is filled with circular punctates. There is also one vessel with multiple zigzag lines in a continuous band around the rim. Occasionally there are wide gashes placed obliquely in alternating directions around the rim fold or strip.

Form:

Rim: Somewhat less than half of the rims are thickened with an added strip or by folding the rim outward and back down onto itself prior to firing. These two techniques are about evenly split in numbers. The rim profile exhibits a range from moderately everted (rim-body juncture more than 90° but less than 150°) to very nearly straight.

Lip: Rounded, flattened, or beveled exteriorly

Base: Exclusively rounded

Body: All vessels which are entirely or partially reconstructed are globular with the width greater than the height. The orifice is always smaller than the greater diameter.

Thickness: Body wall thickness ranges from 3 to 8 mm. and averages about 5 mm.

Appendages: Occasionally there are strap handles of the expanded variety with the widest end attached at the lip of the vessel.

Vessel size: Although most vessels are in the area of 23-25 cm. wide by 20-22 cm., they range upward to 33 cm. wide by 27.5 cm. high with an orifice 29 cm. in diameter.

Geographic range: South-central Indiana from Orange County in the south to Hamilton County in the north

Chronological position: Contemporary with Anderson and Madisonville foci

Probable relationships: The curvilinear guilloche design, globular forms, expanding strap handles, and rim folds and strips clearly indicate relationships with the Fort Ancient materials of southwestern Ohio, rims suggest Madisonville, but the grit tempering points to Anderson. The type should be considered as a combination of Anderson and Madisonville Cord-marked.

OLIVER CORD-MARKED: PLAIN VARIETY (1b)

Paste: Same as Oliver Cord-marked Incised variety
Surface finish: The body is cord marked and the rim is smoothed or cord marked.
Decoration: None
Form: Same as Oliver Cord-marked: Incised variety
Geographic range: Same as Oliver Cord-marked: Incised variety
Chronological position: Same as Oliver Cord-marked: Incised variety
Probable relationships: Same as Oliver Cord-marked: Incised variety

BOWEN CORD-MARKED: CORD-IMPRESSED VARIETY (2a)

Paste:
Method of manufacture: Coiled
Temper: Grit, fine to medium
Texture: Compact, but with some temper exposed on surfaces
Hardness: Averages just above 2.5 but ranges from 2 to 3
Color: Light tan to gray on both surfaces, with a light tan core

Surface finish: Vessel body is cord marked and the rim normally smoothed. Cord-marked rims occur about 15 per cent of the time.

Decoration: Limited to rim and lip areas. Designs are formed by short impressions of cord-wrapped implements (these include the edge or corner of a paddle, a dowel, or a cord-wrapped cord), a knotted cord or tightly twisted cord. The short cord impressions are either so closely spaced as to seem a continuous line, or slightly spread with one end of each short segment more deeply impressed than the other. The designs consist of line-filled triangles, bands of alternating obliquely placed impressions, two to four horizontal

rows of continuous or slightly spaced cord impressions, multiple-rowed chevrons and multiple-rowed chevrons alternating with multiple horizontal rows. When rim castellations occur with the horizontal row motif, the rows curve upward to conform to the outline of the castellation.

Form:

Rim: Slightly to moderately everted and from 3 to 6 cm. in height. Rarely rim folds or strips
Lip: Rounded, flattened, cord-impressed transversely or cord-impressed channeled
Base: Rounded
Body: Globular to slightly elongated globular
Thickness: 3-6 mm.
Vessel size: Ranges from 18 cm. wide by 16.5 cm. high with 12 cm. orifice to 32 cm. wide by 28.5 cm. high with 25.5 cm. orifice

Geographic range: Unknown
Chronological position: Late Woodland
Probable relationships: Canton Ware[8] and through it to Madison Cord-impressed[9]

BOWEN CORD-MARKED: PUNCHED VARIETY (2b)

Paste: Same as Bowen Cord-marked: Cord-impressed variety
Surface finish: Same as Bowen Cord-marked: Cord-impressed variety
Decoration: Circular punctates made with hollow tool, and linear punctates arranged in multiple-rowed chevrons, multiple horizontal rows, alternating multiple horizontal rows and rowed chevrons, single row at edge of lip, and filled triangles
Form: Same as Bowen Cord-marked: Cord-impressed variety
Geographic range: Unknown
Chronological position: Late Woodland
Probable relationships: Same as Bowen Cord-marked: Cord-impressed variety

BOWEN CORD-MARKED: PLAIN VARIETY (2c)

Paste: Same as Bowen Cord-marked: Cord-impressed variety

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[8] Fowler, Melvin L., "Ware Groupings and Decorations of Woodland Ceramics in Illinois," in *American Antiquity,* XX, No. 3 (1955), p. 219.

[9] Baerreis, David A., "Blackhawk Village Site (DA5), Dane County, Wisconsin," in *Journal of the Iowa Archaeological Society,* II, No. 4 (1953), pp. 5-20; Wittry, Warren L., "Archeological Studies of Four Wisconsin Rockshelters," in *Wisconsin Archeologist,* LX, No. 4 (1959), pp. 137-267; and Mason, Ronald J., *Two Stratified Sites on the Door Peninsula of Wisconsin* (University of Michigan Museum of Anthropology, *Anthropological Papers,* No. 26, Ann Arbor, 1966).

Surface finish: Same as Bowen Cord-marked: Cord-impressed variety
Decoration: None
Form:
Rim: Terms used to describe this rim profile include flaring out, out-curving, and moderately everted. The rim-body juncture is rounded in a smooth curve rather than angular as in the sharply everted type. The rim is usually 3-5 cm. high but occasionally reaches 6-7 cm., particularly on vessels with cord-marked rims and scalloped lips. Rim strips and folds are rare.
Lip: Rounded, flattened, or scalloped
Base: Rounded
Body: Sub-globular through globular to elongated globular. There are no sharp angles in the form, which curves smoothly from base through shoulder and neck to the rim.
Thickness: Average 5 mm., range 3-9 mm.
Appendages: Rare, strap handles
Vessel size: Range 18 cm. wide by 16.5 cm. high with 12 cm. orifice to 32 cm. wide by 23.5 high with 25.2 orifice
Geographic range: Unknown
Chronological position: Late Woodland–Fort Ancient
Probable relationships: Same as Bowen Cord-marked: Cord-impressed variety

BOWEN SHARPLY EVERTED RIM (3)

Paste:
Method of manufacture: Unknown
Temper: Normally grit, primarily particles of decomposed micaceous rocks. One partial vessel shell tempered
Texture: Medium fine and compact
Hardness: Grit tempered close to 2.5 while shell tempered 2.0
Color: Mostly dark gray with very little buff or brown
Surface finish: Normally cord-marked body with smoothed rim. A shell-tempered vessel and a few grit-tempered sherds are cord marked on both body and rim.
Decoration: None
Form:
Rim: Sharply angled rim-body juncture with straight rim everted markedly. Shell-tempered vessel with rim in nearly horizontal plane. Generally the rim is less than 3 cm. in height but occasionally up to 5 cm., rim folds very rare, and no rim strips.
Lip: Almost always square or flattened and occasionally cord marked.
Base: Rounded

Body: Globular to slightly flattened globular
Thickness: Range 3-8 mm. and average nearly 5 mm.
Appendages: None
Vessel size: Range 18 cm. wide by 13 cm. high with 11.5 cm. orifice to 36.5 cm. wide by 25 cm. high with 25 cm. orifice
Geographic range: North-central Illinois and southeast into central Indiana
Chronological position: Contemporary with Fort Ancient and Fisher Focus
Probable relationships: Langford pottery of Fisher Focus

BOWEN FABRIC MARKED (4)

Paste:
Method of manufacture: Indefinite coil lines indicating coiling
Temper: Grit, fine to medium, majority medium
Texture: Compact
Hardness: Averages 2.5 with range of 2-3
Color: Gray. One reconstructed vessel had two clearly and markedly different colors. Most of it was gray, but one large sherd, which fit exactly with the gray sherds, was light tan. Differential soil chemistry probably accounts for the change and suggests that color is not a very meaningful attribute.

Surface finish: Fabric marking on body, with rim usually but not always smoothed. Fabric marking is irregular rather than evenly spaced as it is in Mississippian or most of the Fort Ancient sites. Sherds have the appearance of having been malleated with a wad of fabric rather than covered with a layer of it.

Decoration: Restricted to rim. Only six sherds have decoration, the remaining fifty-two rims are smoothed and/or fabric marked. Designs are of two kinds, curvilinear guilloche and close-set cord impressions in parallel horizontal rows or chevrons circling the rim.

Form:
Rim: Moderately everted or flared with a rounded rim-body juncture. There is no modification other than smoothing and the occasional decoration.
Lip: Rounded
Base: Rounded
Body: Globular
Thickness: 4-5 cm.
Vessel size: Only one measurable, 18 cm. wide by 14.3 cm. high with a 13 cm. orifice.

Geographic range: Unknown
Chronological position: Late Woodland–Fort Ancient

Probable relationships: Although fabric impression is common in the Woodland of Appalachia and the Southeast, this wadded kind seems to be an exception. Griffin illustrates several similar sherds from the Fox Farm Component terming them Fox Farm net-impressed.[10] He notes, "The net-impressed sherds at this site do not appear to have come into the area by trade. . . ."[11] The implication is that they are a local version of Appalachian Woodland materials. Winters reported similar material in the Albee complex of the lower Wabash.[12] Kellar found a small amount of fabric-impressed pottery in the upper Wabash.[13]

BOWEN COLLARED: CAMBERED VARIETY (5a)

Paste:

Method of manufacture: Probably modeled since no coil marks were found

Temper: Grit, fine to medium coarse with some decomposed micaceous rock

Texture: Compact, with few tempering particles appearing on either interior or exterior surfaces

Hardness: Ranges from 2-3 and averages just below 2.5

Color: Light tan to dark gray

Surface finish: Body cord marked and rim smoothed

Decoration: Vertical lugs applied to some rims. Designs are formed by short impressions of cord-wrapped implements such as the edge or corner of a paddle, a dowel, or another cord, or by a knotted or tightly twisted cord. The short cord impressions are either so closely spaced as to seem a continuous line or slightly spread and resembling punctates. One end of each short impression is usually deeper than the other end. Cord impressions are applied in a multiple-row chevron design around the rim, and in some instances across the lugs. Linear punctates made with a pointed instrument occur in multiple horizontal rows circling the rim. Such punctates are deeper at one end and suggest that the tool was held at a low angle and jabbed. Vessel lips are decorated with transverse cord impressions and channeled with cord impressions or linear punc-

[10] Griffin, *The Fort Ancient Aspect,* Plate CXIII, nos. 8-10.

[11] *Ibid.,* p. 177.

[12] Winters, Howard D., *An Archaeological Survey of the Lower Wabash Valley in Illinois* (Illinois State Museum, *Reports of Investigations,* No. 10, Springfield, 1967), pp. 74-75.

[13] Kellar, James H., "Prehistory in the Salamonie and Mississinewa Reservoir Areas, Indiana" (National Park Service Report on file at Northeast Region Office, Philadelphia, n.d.), p. 12.

tates. Sometimes the rim is plain and may or may not have vertical lugs.

Form:

Rim: The rim is collared with a pronounced camber which in profile looks like an open S. There is a marked constriction at the neck of the vessel and what would be a vertical rim if straight, instead curves outward and then back in to form an orifice which has very nearly the same diameter as the constriction at the neck. Rims are 4.5 to 7 cm. high.
Lip: Almost always flattened or decorated with cord impressions or punch and drag
Base: Rounded
Body: Sub-globular to globular
Thickness: 4-6 mm.
Appendages: Vertical lugs, 6-14 per vessel, pinched out of rim surface or appliquéd
Vessel size: Range: 32-36 cm. wide by 23-28 cm. high with orifices 24-29 cm. in diameter

Geographic range: Central Indiana from Hamilton County south to Orange County and possibly at the Fisher Site in Illinois

Chronological position: Late Woodland-Fort Ancient

Probable relationships: Cambria, Over Focus

BOWEN COLLARED: STRAIGHT VARIETY (5b)

Paste:

Method of manufacture: Unknown
Temper: Grit, fine to medium, with majority medium
Texture: Compact, tempering particles rarely appearing on the surfaces
Hardness: Averages just above 2.5 but ranges from 2-3

Color: Light tan to gray exterior and interior. Core is tan.

Surface finish: Vessel body cord marked and the rim usually smoothed but occasionally also cord marked. On one nearly complete vessel the neck and most of the rim was smoothed but collar portion was cord marked.

Decoration: Limited to the collared portion of the rim. Most common decoration consists of three or four parallel horizontal rows circling the rim made by short cord impressions or by punch and drag. The cord impressions and the punctations form continuous lines since the former are close set and the drag portion of the latter connects the deeper punches. Circular punctates and knotted-cord impressions occur in similar horizontal rows. Rarely

there are cord-impressed, rowed chevron designs as well. One vessel appeared to have the punch-and-drag technique, but there was separation between the elements which were randomly placed in all directions around the collared portion of the rim with no apparent pattern.

Form:

Rim: Rims are collared by the addition of a substantial rim strip and/or the exterior offset or channeling of the interior of the rim, setting off the rim area from the neck of the vessel in a distinctive manner. This gives the rim a pronounced collared look (see Figure 10e). Variation in rim attitude ranges from vertical to extremely everted. One vessel's orifice was six sided and castellated at each of the angles formed by the junctures of the sides. That particular vessel has strong similarities to Iroquois collared pottery.
Lip: Flattened and transversely cord impressed, channeled by cord impression or channeled by punch and drag
Base: Rounded
Body: Elongated globular to globular
Thickness: 3-6 mm.
Vessel size: 22-23 cm. wide by 22-27.5 high, with orifices 19-24 cm. in diameter

Geographic range: Unknown

Chronological position: Late Woodland

Probable relationships: Collared pottery tradition of Late Woodland in eastern United States, perhaps most specifically to Pisgah of western North Carolina

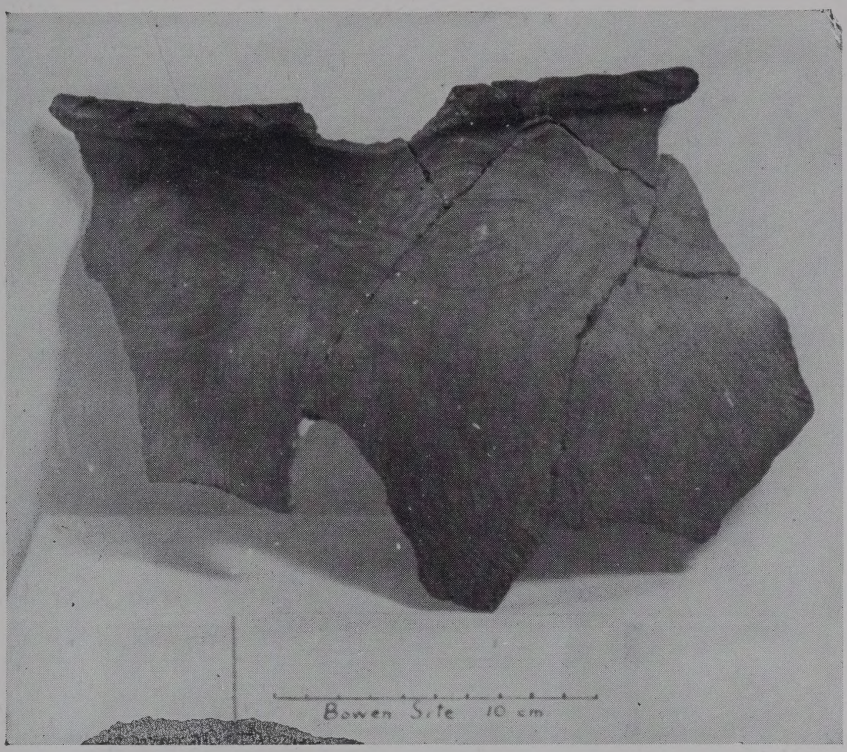

Plate VIII. Rim Section of an Oliver Cord-marked: Incised Variety from Bowen Site

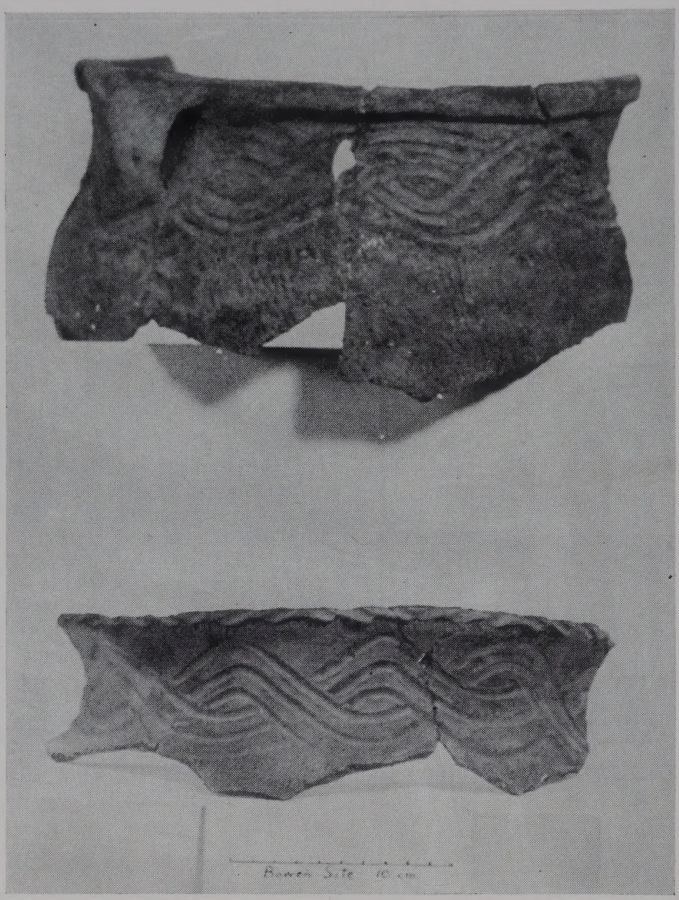

Plate IX. Rim Sections of Oliver Cord-marked: Incised Variety from Bowen Site

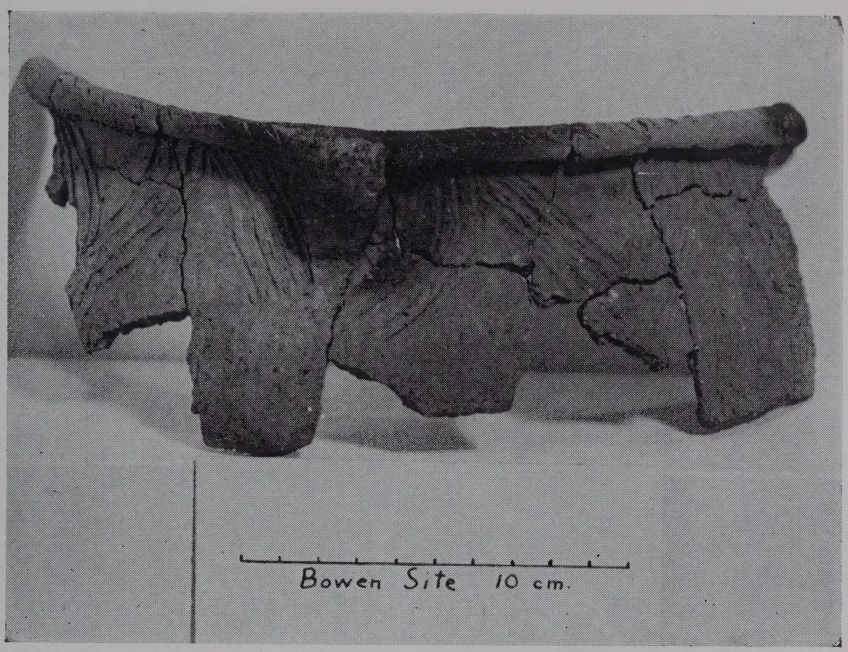

Plate X. Rim Section of Oliver Cord-marked: Incised Variety from Bowen Site

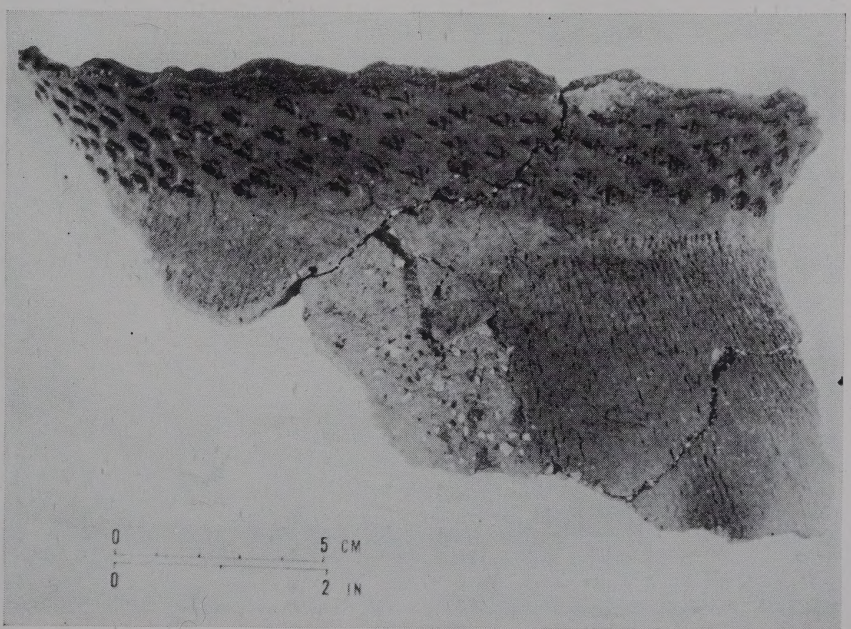

Plate XI. Rim Section of Bowen Cord-marked: Cord-impressed Variety from Bowen Site

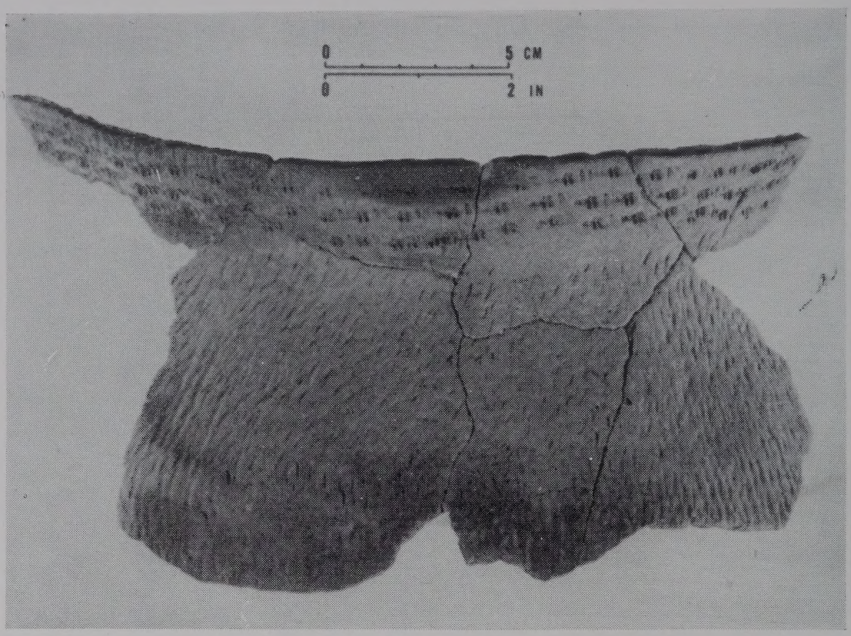

Plate XII. Rim Section of Bowen Cord-marked: Cord-impressed Variety from Bowen Site

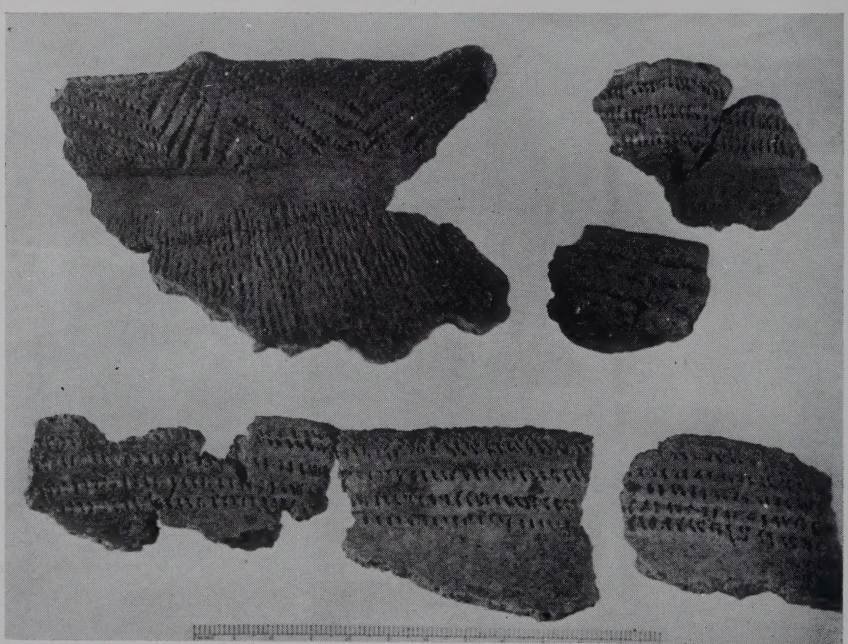

Plate XIII. Sherds of Bowen Cord-marked: Cord-impressed Variety from Bosson Site

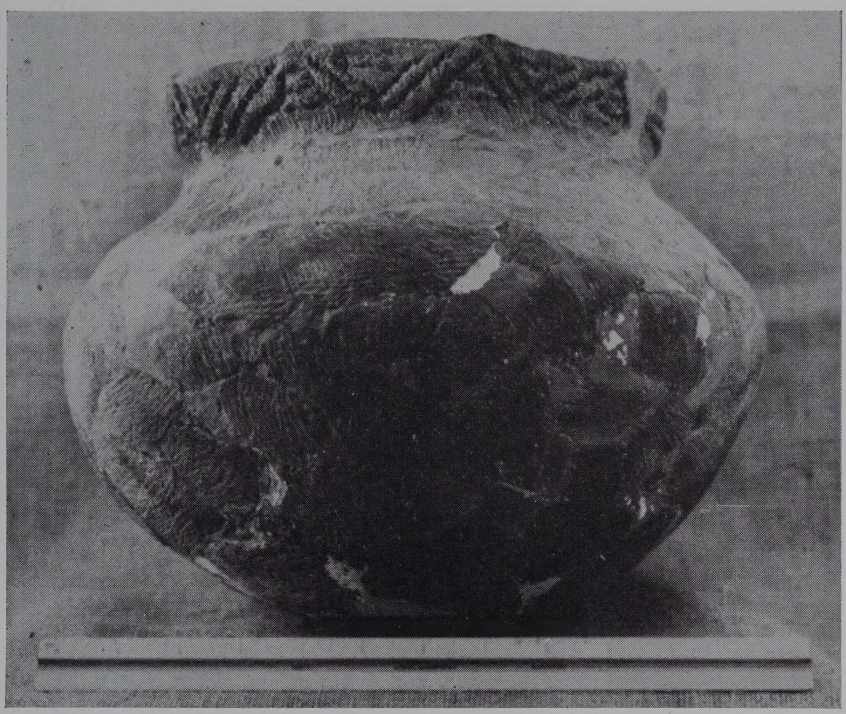

Plate XIV. Reconstructed Vessel of Bowen Cord-marked: Cord-impressed Variety from Bosson Site

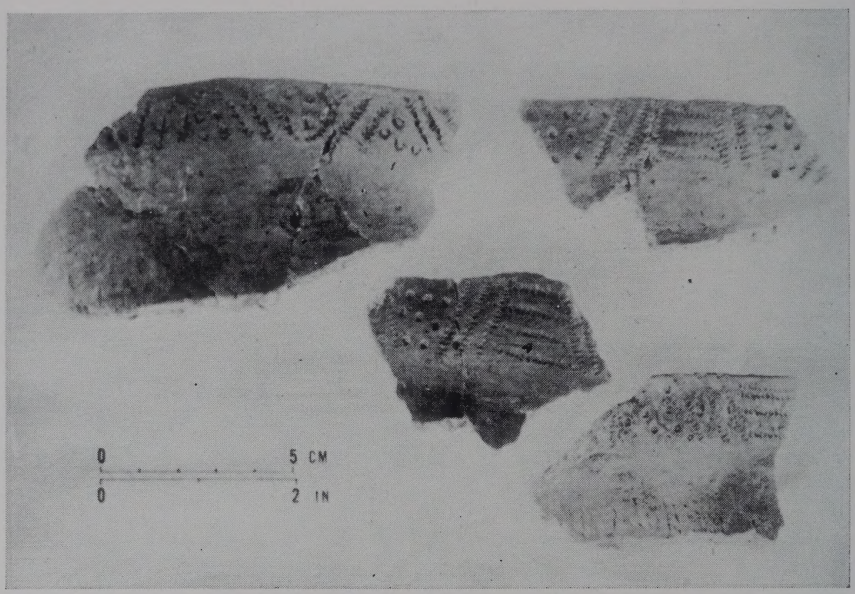

Plate XV. Rim Sherds of Bowen Cord-marked Variety Showing Both Cord-impressed and Punched Designs from Bowen Site

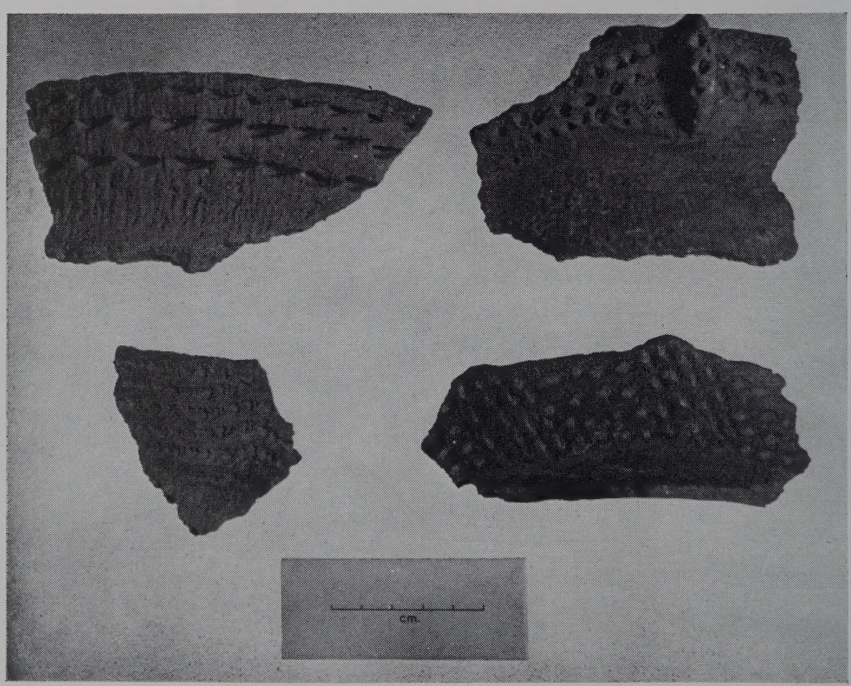

Plate XVI. Rim Sherds of Bowen Cord-marked: Punched Variety from Bowen Site

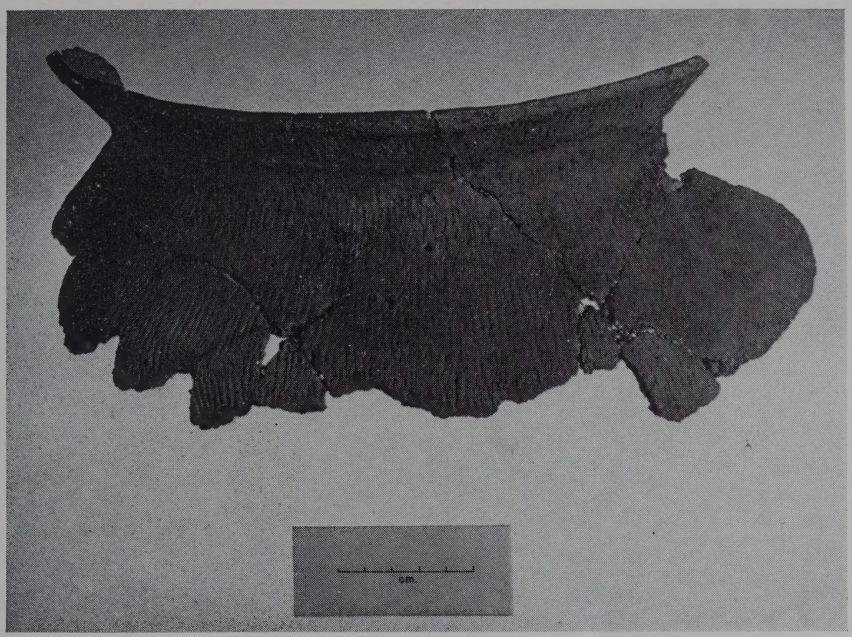

Plate XVII. Rim Section of Bowen Cord-marked: Plain Variety from Bowen Site

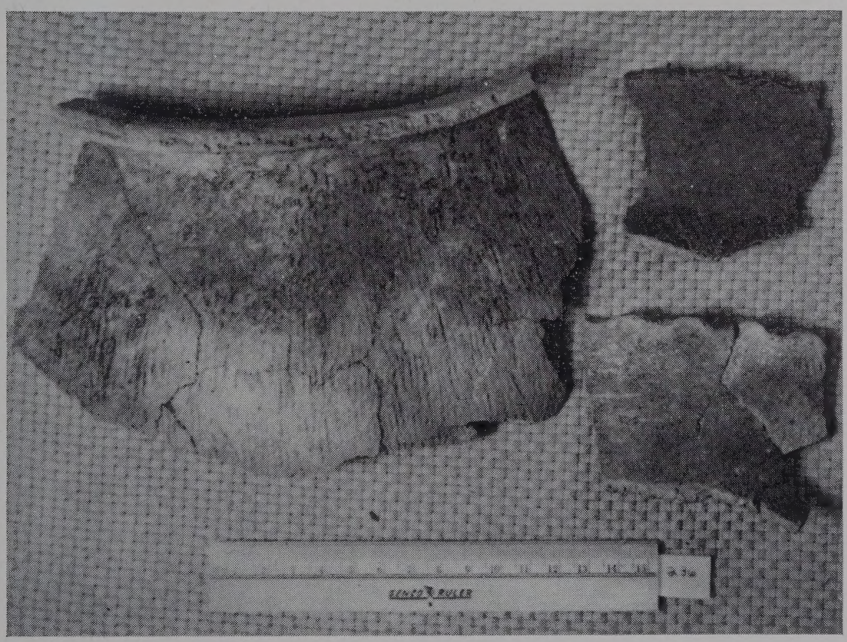

Plate XVIII. Rim Section and Sherds of Bowen Cord-marked: Plain Variety from Bowen Site

Plate XIX. Partially Reconstructed Vessel of Bowen Cord-marked: Plain Variety from Bowen Site

Plate XX. Reconstructed Vessel of Bowen Cord-marked: Plain Variety from Bosson Site

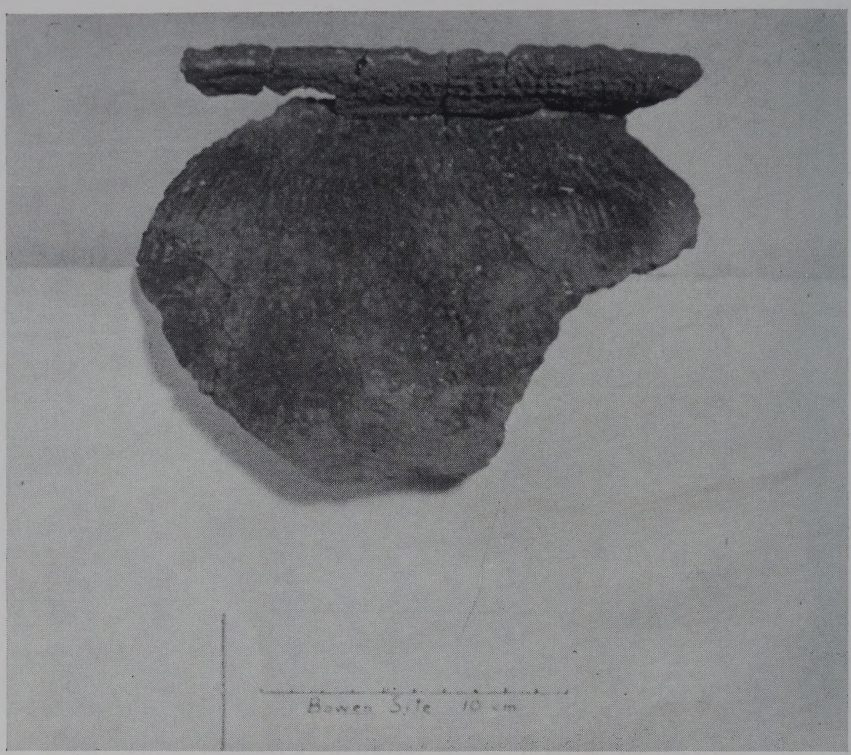

Plate XXI. Section of Shell-tempered Vessel of Bowen Sharply Everted Rim Type from Bowen Site

Plate XXII. Rim Section of Bowen Fabric-marked Type from Bowen Site.

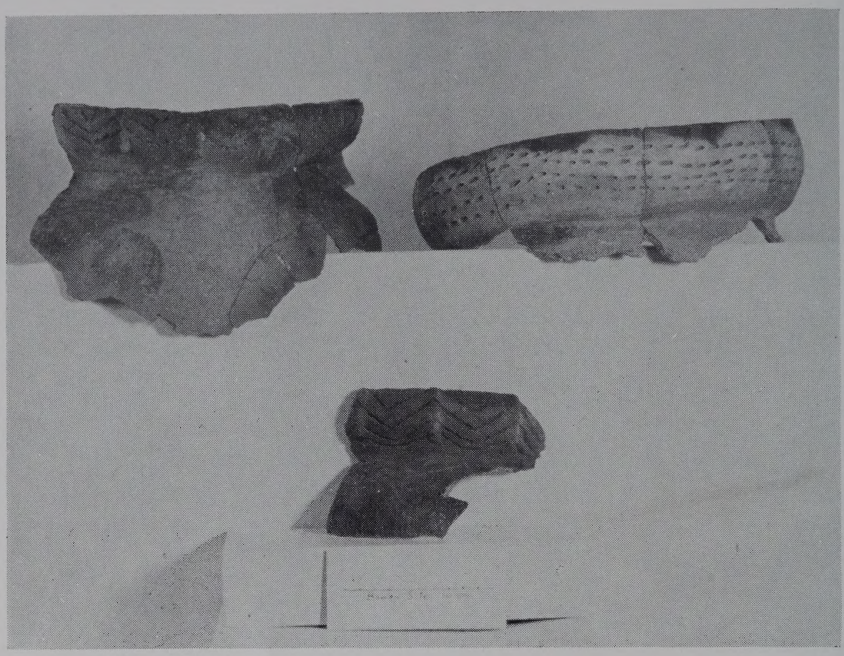

Plate XXIII. Rim Sections of Bowen Collared: Cambered Variety from Bowen Site

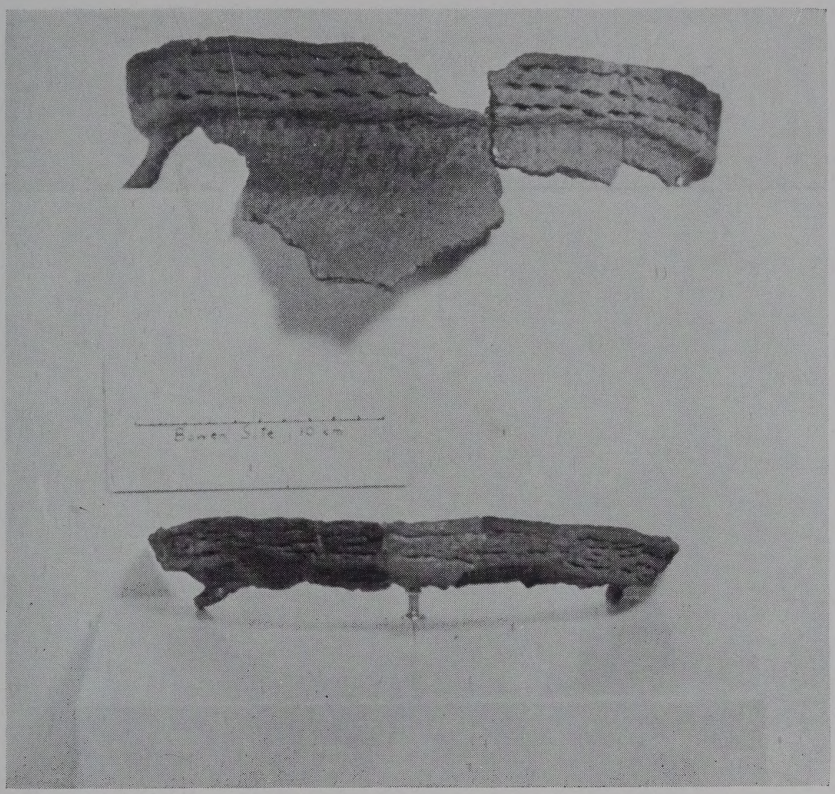

Plate XXIV. Rim Sections of Bowen Collared: Straight Variety from Bowen Site

Plate XXV. Top View of Partially Reconstructed Vessel of Bowen Collared: Straight Rim Variety from Bowen Site

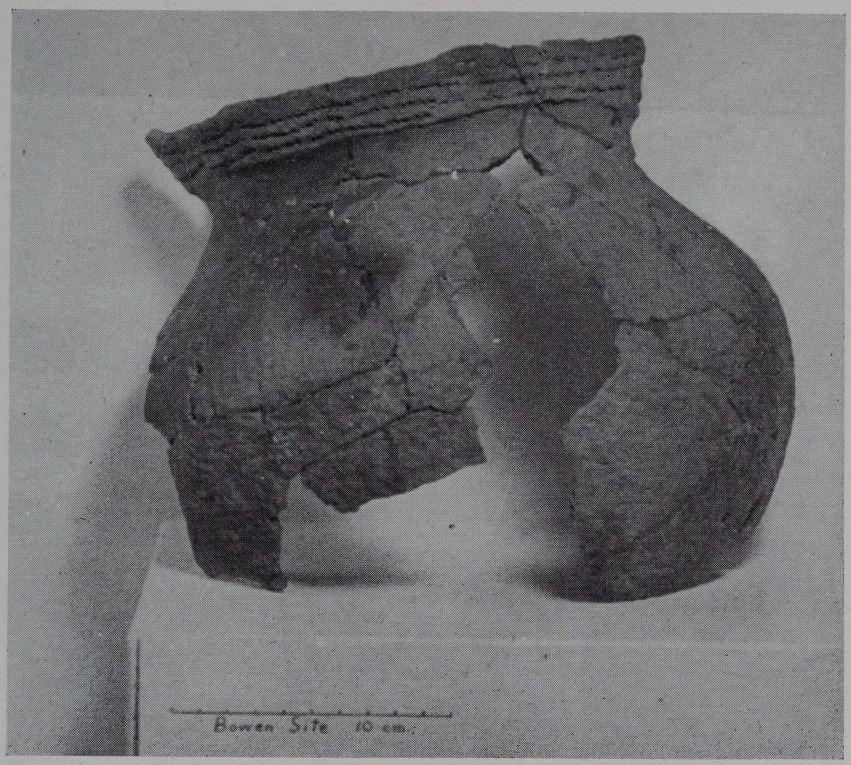

Plate XXVI. Lateral View of Vessel Shown in Plate XXV

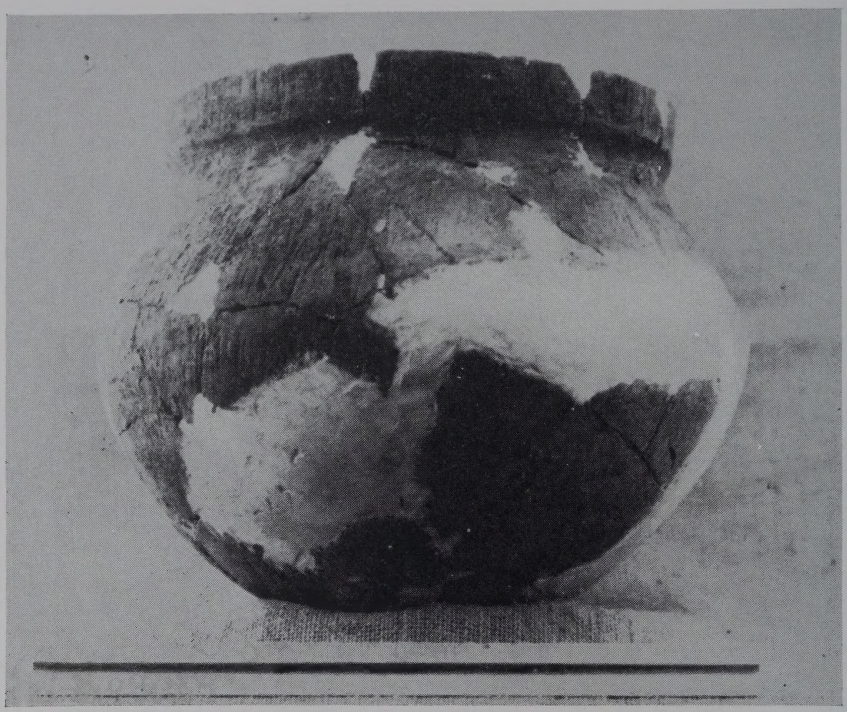

Plate XXVII. Reconstructed Vessel of Bowen Collared: Straight Variety from Bosson Site

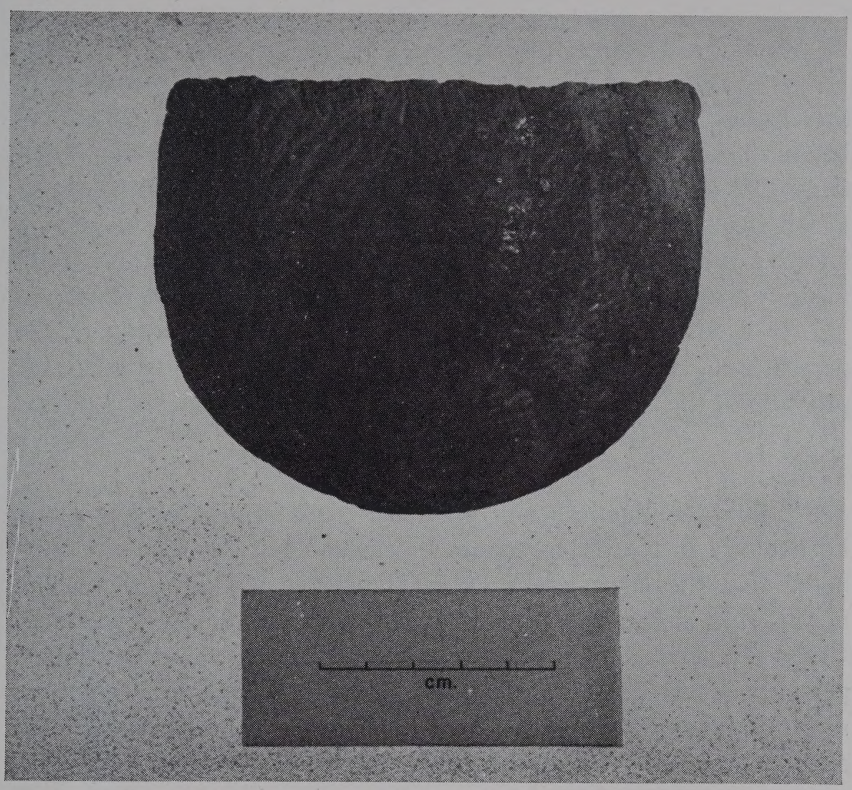

Plate XXVIII. Small Atypical Vessel from Bowen Site

Animal and Plant Remains

Although there is a wealth of information to be gained from the organic remains from a habitation site, only a small amount of botanical data from the Bowen Site was available for examination. Only those items which can be found by careful but admittedly gross examination of soil were recovered. The result of such a selective procedure is certainly skewed, but an attempt has been made to incorporate the data and interpret it within limits.

It would be safe to say that the subsistence economy of the people living at the Bowen Site was a mixed one, involving the products of the forest, the river, and to a certain degree horticulture.

Animals

While the importance of vegetable foods in general, and maize horticulture in particular, cannot be evaluated specifically, it can be noted that the large quantities and varieties of animal bone and mussel shell suggest that it was of less than paramount importance. Cleland pointed out that in an economic system which placed primary importance on agriculture, hunting became highly selective and utilized only a few common and usually sizable animals such as deer. But where agriculture was less dominant, there were far more species with a far greater size range utilized.[14]

Reported species of plant and animal life found in central Indiana have been noted above (p. 216). Of the thirty-nine mammalian species reported twenty-two were present in the Bowen Site material. There was not a proportionate utilization of the bird population (253 reported species) with ten species recorded for the site. Only the turkey occurred in substantial numbers.

Turtles and frogs do not appear to have been an important food source but fish and clams were. Large numbers of aquatic and terrestrial snails were recovered, primarily from pits. These were probably of posthabitation origin and concentrated in features be-

[14] Cleland, *The Prehistoric Animal Ecology and Ethnozoology of the Upper Great Lakes Region*, p. 84.

cause of the softer earth which made up most of the fill. The possible utilization of snails as a food source should not, however, be completely ruled out.

Table 15 lists the faunal remains by species, in the order of the frequency of their occurrence. Minimum numbers of individuals represented were calculated within each species. Percentage figures are based on the total number of individuals and not the number of bones recovered.

TABLE 15. *Faunal Remains*

Common Name	Scientific Name	Minimum No. Individuals	Per cent
Whitetail deer	Odocoileus virginianus	382	49.93%
Turkey	Meleagris gallopavo	83	10.84
Raccoon	Procyon lotor	40	5.22
Gray squirrel	Sciurus carolinensis	35	4.57
Fox squirrel	Sciurus niger rufiventer	25	3.26
Dog	Canis familaris	32	4.18
Deermouse	Peromyscus spp.	22	2.87
Woodchuck	Marmota monax	20	2.61
Elk	Cervus canadensis	17	2.22
Beaver	Castor canadensis	10	1.30
Cottontail rabbit	Sylvilagus floridanus	10	1.30
Muskrat	Ondatra zibethicus	7	0.91
Mallard	Anas platyrhynchos	6	0.78
Black bear	Euarctos americanus	6	0.78
Box turtle	Terrapene carolina	5	0.65
Frog	Rana spp.	5	0.65
Eastern mole	Scalopus aquaticus	4	0.52
Gray eastern chipmunk	Tamias striatus	4	0.52
Bobcat	Lynx rufus	4	0.52
Porcupine	Erethizon dorsatus	4	0.52
Gray wolf	Canis lupus	4	0.52
Opossum	Didelphis virginiana	3	0.39
Coyote	Canis latrans	3	0.39
Snapping turtle	Chelydra serpentina	3	0.39
Passenger pigeon	Ectopistes migratorius	3	0.39
Canadian goose	Branta canadensis	3	0.39
Bullfrog	Rana catesbiana	2	0.26
Pied-bill grebe	Podilymbus podiceps	1	0.13
Badger	Taxidea taxus	1	0.13
Mountain lion	Felis concolor	1	0.13
Buffalo fish	Ictiobus bubalus	1	0.13
Red-shouldered hawk	Buteo lineatus	1	0.13
Striped skunk	Mephitis mephitis	1	0.13
Leopard frog	Rana pipiens	1	0.13
Loon	Gavia immer	1	0.13

TABLF 15. *Faunal Remains*—continued

Common Name	Scientific Name	Minimum No. Individuals	Per cent
Mourning dove	Zenaidura macroura carolinensis	1	0.13
Snowy egret	Egretta thula	1	0.13
Long-nosed gar	Lepisosteus osseus	1	0.13
Bobwhite	Colinus virginianus	1	0.13
Mink	Mustela vison	1	0.13
Screech owl	Otus asio	1	0.13
Soft shell turtle	Amyda ferox	1	0.13
Osprey	Pandion haliaetus	1	0.13
Fish	Various species but not identified specifically	More than 50 occurrances	
Turtle	Not identified to species	Seven occurrances	
Proboscidian	Two fossilized foot bones		
Fresh water mussel shells	Numerous species	4,562	
Aquatic snails	Campeloma most common sp.		
	Pleurocera sp.	188	
Terrestrial snails	Ventridens ligerus		
	Mesodon spp.		
	Triodopsis spp.	413	
	Anguispira alternata		
	Lampsilis siliquoidea		

Botanical Remains

Slightly over 740 botanical items were examined in addition to the Carbon 14 specimens, and an attempt was made to identify them. They included 652 kernels of corn (*Zea mays*), 53+ fragments of cob, 12+ fragments of corn stalk, 15 fragments of hickory nut shell (*Carya glabra*) and two walnut shells (*Juglans nigra*). Six remaining items could not be identified by the writer.

The maize was, of course, of primary interest. While present in only twenty-five of the 120 pits, fireplaces, and other distinctive disturbed areas recorded, the distribution of the twenty-five was throughout the site. Nearly all maize plant fragments were from well below plough zone in contexts which leave no doubts as to their prehistoric origin.

One section of cob from the 2.8 to 3.2-foot level of Feature 60 was an eight-row variety. It was the only specimen of cob complete enough for the writer to be certain of the rows, row pairing, and the hexagonal cross section which are the main fea-

tures of Yarnell's description of what Carter and Anderson called Eastern Complex corn.[15] Thus, although there may have been other varieties in use at the site, their existence is not, at this time, known.

Table 16 summarizes the evidences of botanical remains.

TABLE 16. *Botanical Remains*

Feature	Description	Level	Block
5	1 fragment cob w/2 kernels	2.8-3.2 ft.	A
5	100± kernels	2.8-3.2	A
5	10± cob fragments	2.8-3.2	A
11	10 cob fragments	1.6-2.0	A
11	? nut	1.6-2.0	A
18	10 kernels	1.6-2.0	A
20	3 kernels	2.8-3.2	A
39	2 kernels	1.2-1.6	29
40	? nut	1.6-2.0 ft.	27-29
42	1 kernel	1.2-1.6	35 & 36
42	2 cornstalk fragments	1.2-1.6	35 & 36
42	1 hickory nut	2.0-2.4	35 & 36
43	1 kernel	.8-1.2	31, 32 36, 37
43	41 kernels	1.2±	31, 32 36, 37
44	2 kernels	1.2±	36, 37, 42
45	? seeds	1.2-1.6	41-42
46	1 kernel	1.6-2.0	30, 35, 46
46	1 kernel	2.4-2.8	30, 35, 46
46	2 kernels	2.8-3.2	30, 35, 46
46	5 kernels	3.2-3.6	30, 35, 46
46	1 kernel	3.6±	30, 35, 46
46	hickory fragments	1.2-1.6	30, 35, 46
46	hickory fragments	2.0-2.4	30, 35, 46
46	? nut fragment	2.0-2.4	30, 34, 46
47	1 hickory fragment	2.4-2.8	50
47	? nut	2.4-2.8	50
52	4 kernels	2.6-3.2	18
54	37 kernels	1.0-1.2	84
54	18 kernels	1.2±	84
54	8 stalk fragments	1.2±	84
55	1 kernel	.8± ft.	87
57	? kernels	1.2-1.6	89-96
60	233 kernels	2.8-3.2±	100

[15] Yarnell, Richard A., *Aboriginal Relationships between Culture and Plant Life in the Upper Great Lakes Region* (University of Michigan Museum of Anthropology, *Anthropological Papers,* No. 23, Ann Arbor, 1964), p. 107; Carter, George F., and Edgar Anderson, "A Preliminary Survey of Maize in the Southwestern United States," in *Annals of the Missouri Botanical Gardens,* XXXII, No. 3 (Saint Louis, 1945), pp. 297-322.

TABLE 16. *Botanical Remains*—continued

Feature	Description	Level	Block
60	10 cob fragments	2.8-3.2±	100
61	2 kernels	2.4-2.8	100
61	31 kernels	2.8-3.0	100
68	cornstalk fragment	2.8±	106-109
68	1 kernel	2.4-2.8	106-109
68	stalk fragments	2.4-2.8	106-109
74	2 kernels	1.2-1.6	105
78	1 kernel	1.2-1.6	118
79	1 kernel	.8-1.2	119
86	1 kernel	2.0-2.4	124
89	1 kernel	1.6-2.0	127
89	1 hickory nut fragment	1.6-2.0	127
90	1 kernel	1.2-1.6	127
90	3 kernels	2.4-2.8	127
99	1 kernel	.8-1.2	141
102	1 hickory nut fragment	2.0-2.4	159-162
102	1 hickory nut fragment	2.4-2.8	159
102	6 hickory nut fragments	2.8-3.2	159
102	2 kernels	.8-1.2	159
111	whole walnut	1.2-1.6 ft.	231
112	27 kernels	1.6-2.0	233-224
112	5 kernels	2.4-2.8	233-224
112	2 kernels	2.8-3.2	233-224
112	1 kernel	4.0-4.2	233-224
Burial 20	2 kernels	1.2-1.6	155
	15 kernels	.8-1.2	A
	36 kernels	1.2-1.6	A
	1 cob fragment	.8-1.2	A
	? nut, probably same as in Fea. 11	1.2-1.6	4
	hickory fragments	1.2-1.6	18, 26, 71, 72
	20 cob fragments	.8-1.2	102
	1 kernel	.8-1.2	118
	1 hickory fragment	.8-1.2	127-128
	1 walnut fragment	.8-1.2	127-128
	2 kernels	.8-1.2	142
	40 kernels	1.2-1.6	170
	3 kernels	.8-1.2	226-227
	1 kernel	.8-1.2	89

BURIALS

Human bone remains at the Bowen Site consisted of forty-two numbered, whole or fragmentary, burials and some twenty fragments which were identified as human but were not in a "burial" context. The latter came to light in the faunal analysis. Of the numbered burials, Nos. 40, 41, and 42 were actually parts of the same

burial, and No. 29 was too fragmentary for analysis. Thus, there were thirty-nine burials which could be sexed, aged, measured, examined for pathology, and described morphologically. Table 17 summarizes all of this data except the last.

Of the thirty-nine considered, ten burials were male, sixteen were female, eleven were too young to differentiate, two were indeterminate.

Although eighteen of the thirty-nine burials were of persons who had died at age thirteen or younger, none were neonatal. The youngest was seven months old. The absence of newborns is probably explained by the preservation conditions at the site. In general, bone was in very poor condition due both to soil acidity and the relatively low-lying position of the site next to a river which permitted flooding. The changeable conditions added to the deterioration of bone and probably completely destroyed the soft, cartilaginous bones of the neonate.

Fig. 13 shows the frequencies of ages at death, male and female, by two-year intervals for the entire population.

The sample was too small to make detailed observations; however, there did seem to be a disproportionate number of females to males. This could easily have been a result of the small sample except that the difference was in essentially one age group. There were no male deaths from the fourteenth through the twenty-third year, but there were five female deaths at ages seventeen to twenty. It is highly probable that the latter were due to first pregnancies while the lack of males may have reflected where death occurred. Young men may have been roaming, hunting, and fighting elsewhere and in general dying away from the village and being buried where they died rather than being returned home.

Although precise figures could not be given due to attrition, both ante- and postmortem, there appeared to be a high incidence of caries and other dental pathology. Of the fifteen burials which were over twenty years of age, nearly all showed some bone growth over tooth sockets from which the tooth had been lost prior to death. These burials ranged in age from twenty-four to seventy

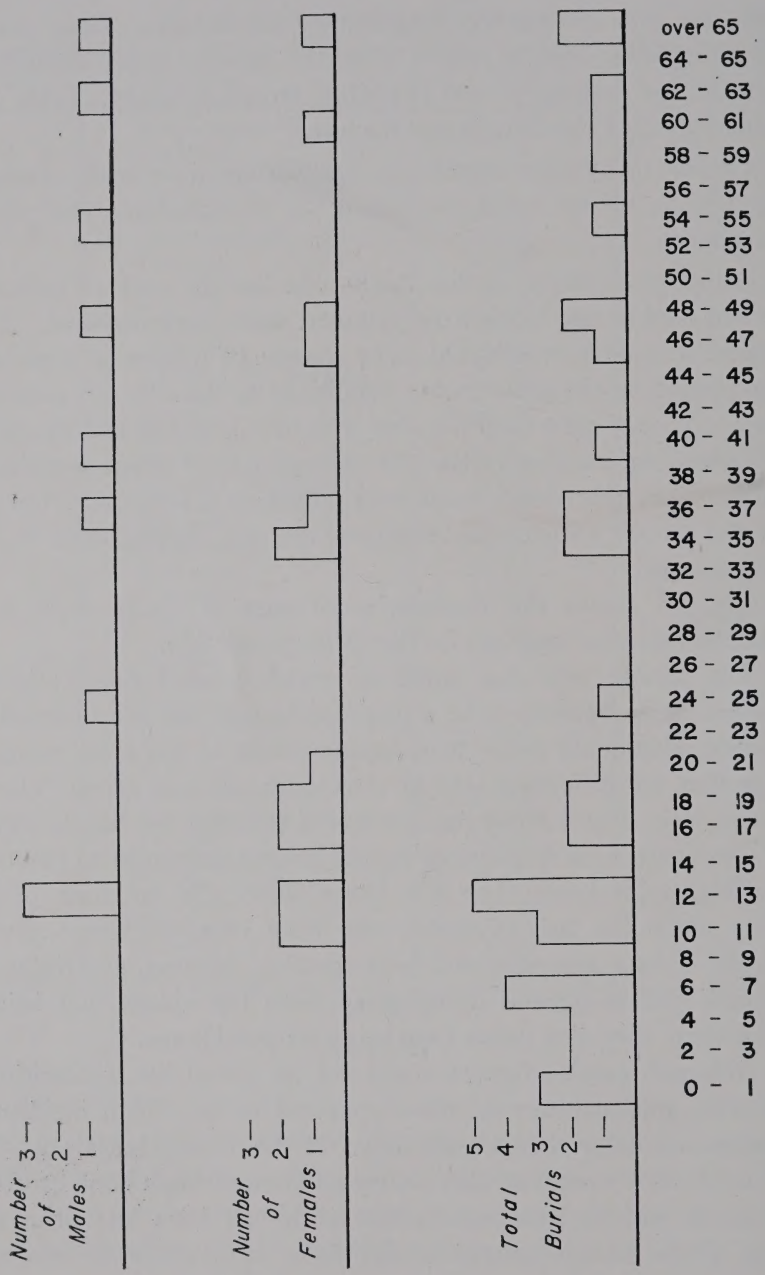

FIG. 13. AGE-AT-DEATH FREQUENCIES

and had an average of 2.6 teeth missing antemortem and 2.0 caries per person. Some 8 per cent of the teeth examined were carious.

Herrala demonstrated that there is a direct correlation between increased vegetable (principally corn) diet and increased caries among prehistoric and historic Indian groups in the eastern United States. The incidence of carious teeth rose from less than 1 per cent among the principally meat-, fish-, and mussel-eating Archaic, Indian Knoll, and Old Copper groups to 4.4 per cent in Illinois Hopewell at the Klunk Mound, to 8.2 per cent in the Upper Mississippi Oakwood Mound people and finally to 10.3 per cent at the Middle Mississippian Angel Site.[16]

The suggestion was made that the cellulose cell walls of corn in particular, combined with excessive grit from the stone grinding of corn, may have caused more wear than did meat, which has no cellulose cell walls, or vegetable food prepared without the use of stone grinders. Since vegetable food, particularly corn, forms an increasingly greater proportion of the total diet through time, this would account for the greater wear which in turn permitted more caries due to thinner layers of protective enamel.

The pattern of substantial evidence of corn, fifty-four examples of grinding stones, and dental caries in 8 per cent of the teeth present corresponded closely to that for the Upper Mississippi Oakwood Mound people.

Other pathology was primarily in the form of fractures, arthritis, periostitis, and osteomyelitis. One particularly troubled female suffered from ankylosis of the third and fourth lumbar vertebrae, considerable and widespread arthritis, and had thirty-one kidney or gall stones.[17]

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[16] Herrala, Elizabeth Ann, "The Incidence of Dental Caries and Alveoloclasia in a Number of Pre-Historic and Historic American Indian Groups of the Middle West" (Master's thesis, Indiana University, Bloomington, 1961), pp. 44-46.

[17] Examination and identification of the stones was made by C. W. Beck of the Indiana University Geology Department. See Beck to Richard B. Johnston, 1963, Glenn A. Black Laboratory of Archaeology, Indiana University, Bloomington.

All skulls were undeformed, and on a morphological basis, Neumann placed all but one of those burials complete enough for such examination in what he now calls the Ilinid variety (previously Lenapid).[18] The Ilinid was described basically as follows: the cranial vault is ovoid to ellipsoid in shape. Muscularity, brow ridge size, frontal slope, size of parietal eminences, and occipital

Plate XXIX. Partly Flexed Burial, Bowen Site

position all tend to be in the medium range in degree of development. There is little sagittal cresting, and flattening of the lambdoid region ranges from a small to a medium degree of expression. The typically Ilinid face displays only slightly more than an average degree of robusticity and appears to be of moderate size relative to the braincase. The zygomatic arches display a moderate amount of anterior projection but a medium to pronounced degree of lateral

[18] Memorandum from Georg K. Neumann to the author.

projection. The orbits are from oblong to square in shape with a submedium to medium degree of inclination of the transverse axis. The nasal form is described as being mesorrhine. The breadth of the nasal root and the nasal bridge tends to be medium in proportion, while the height of the nasal bridge ranges from medium to high in degree of elevation. There tends to be a medium to submedium amount of facial prognathism. The mandible is inclined to be medium to large in size with a narrow bilateral chin form but with only a small amount of gonial eversion.[19]

The single skull not classed as Ilinid was of the Muskogid (previously called Walcolid) variety, which was most recently described thus: The Muskogid skull tends to be rather large. The braincase tends to be high relative to its length and may be classed as mesocephalous. The cranial vault displays a short ovoid form with a medium to pronounced degree of robusticity. The brow ridges and frontal breadth display a medium degree of development. There is a slight to medium amount of frontal sloping and little, if any, amount of sagittal elevation. The parietal eminences are in a medium position with little or no flattening of the lambdoid region, and the occiput is situated in a medium high position. The Muskogid face is rather distinctive in that it appears to be large for the braincase. Facial dimensions are large but indices tend to fall within the medium-size range. The zygomatic bones tend to range from medium to large in size and in anterior and lateral projection. This helps to emphasize the rugged nature of the face. The shape of the orbits are usually rhomboid or square with a small to medium degree of inclination of the horizontal axis. Nasal form tends to fall in the range of mesorrhine. The nasal root and bridge dimensions are in the medium range. The face displays a submedium to medium amount of prognathism, and while the mandible tends to be medium in bilateral development, there is seldom any

[19] Robbins, Louise M., "The Identification of the Prehistoric Shawnee Indians—The Description of the Population of the Fort Ancient Aspect" (Ph.D. dissertation, Indiana University, Bloomington, 1968), pp. 32-33.

gonial eversion of the mandible.[20]

If the metric data of the Muskogid series is compared to that of an Ilinid series, few distinct differences are apparent; but when morphological observations are included in the comparison, the diagnostic traits of each series are more readily revealed. The Ilinids tend to have a somewhat more elliptical cranial vault while the vault of Muskogids has a broad ovoid or spherical form. Additional differences are noted in the larger, broader face and greater chin prominence of the Muskogids. A greater amount of sagittal elevation and lambdoid flattening plus greater prominence and lower positioning of the occiput also serve to distinguish the Ilinid from the Muskogid variety.[21]

The distribution of burials in the site was of interest since there were four clusters which included all but two of the numbered remains (see Fig. 14). Twelve burials formed the cluster in the northwest area, four in the north, eleven in the northeast and eleven in the southeast. The two remaining burials were located, one in the south and one in the southwest.

Burials 17 and 24 were intruded upon by Burials 16 and 28, respectively, and their placement suggested that enough time had elapsed between the earlier and later burials that the location of the earlier ones had been forgotten and they were thus disturbed by the later.

Dog Burials

Excavators recorded nine dog "burials." Whether these were intentional burials or merely deposition of refuse could not be determined. Numerous other dog bones were recovered in the faunal analysis from disarticulated contexts which suggested that dogs were probably eaten. Certainly there is ample evidence of such a practice in historic records from many parts of the eastern United States. Although nine "burials" were articulated, it seems more likely that burial was due to more practical consideration than reverence for this animal.

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[20] *Ibid.*, pp. 59-68.

[21] *Ibid.*, p. 68.

TABLE 17. *Burial Data*

See map, pp. 302-303 for locations

Key: St = Stake; Bl. = Block; Fea. = Feature; O = Too young for sex determination

Number	Location	Sex	Age	Stature (in meters)	Position	Material Association	Pathology
1	1 ft SW, St. 6	M	65	1.722	Flexed	Debris	———
2	5 ft W, 1 ft S, St. 9	F	12	———	Flexed	Debris	———
3	Fea. 8	F	18	1.612	Partially Flexed	Debris	———
4	12 ft N-2 ft E, St. 4	F	10	———	Disturbed Fragmentary	———	———
5	Fea. 23, Bl. 1	F	37	———	Partially Flexed	Debris	Extensive osteo-myelitis
6	Fea. 25, Bl. 8	?	10	———	Partly Flexed	None	———
7	Fea. 26, Bl. 6 & 7	M	40	———	Flexed	Miniature celt in right hand, drill under scapula, human ribs under skull	Arthritis, Compressed vertebral fracture
8	Intrusive in Fea. 28, Bl. 18	F	60	1.574	Partly Flexed	None	———
9	W. side, Bl. 86	M	49	———	Partly Flexed	None	———
10	W. side, Bl. 86	F	11	———	Flexed	Under pile of stones	———
11	N. side, Bl. 89	M	12	———	Flexed	Skull missing but mandible present	———
12	N. side, Bl. 89	M	37	1.690	Partly Flexed	Debris	———
13	N. side, Bl. 88	F	35	1.653	Partly Flexed	Debris	———
14	NW corner Bl. 91	O	1	———	Extended	Debris	———

TABLE 17. *Burial Data*—continued

See map, pp. 302-303 for locations

Key: St = Stake; Bl. = Block; Fea. = Feature; O = Too young for sex determination

Number	Location	Sex	Age	Stature (in meters)	Position	Material Association	Pathology
15	S. end Bl. 106 & 197	F	48	1.694	Partly Flexed	Debris	Ankylosis of 3rd & 4th Lumbar vertebrae, 31 kidney or gall stones, lipped pubic symphysis & other arthritis
16	Center Bl. 115 intrudes B17	?	58	If male 1.666 If female 1.611	Flexed	Debris	Medium vertebral arthritis
17	Center Bl. 115	F	46	1.560	Flexed	Debris	———
18	Fea. 74, Bl. 105 & 106 Midline	O	2	———	Fragmentary	Debris	———
19	Bls. 155 & 156	O	7	———	Partly Flexed	Debris	———
20	Bls. 155 & 156	F	34	1.595	Flexed	Debris	———
21	Bl. 157	M	63	1.709	Flexed	Debris	———
22	Bl. 158 Assoc. B23	M	54	1.701	Partly Flexed	Celt under rt. hand	Remodeling of prox. femur, Arthritis, periostitis
23	Bl. 158 Assoc. B22	O	6	———	Partly Flexed	None	———
24	Bl. 160 Intruded by B28	M	24	———	Reburial Flexed	None	———
25	Center Bl. 161	F	17	———	Flexed	None	———
26	Bls. 160 & 157	O	7	———	Flexed	None	———

TABLE 17. *Burial Data*—continued

See map, pp. 302-303 for locations

Key: St = Stake; Bl. = Block; Fea. = Feature; O = Too young for sex determination

Number	Location	Sex	Age	Stature (in meters)	Position	Material Association	Pathology
27	Center Bl. 160	M	12	———	Flexed	Debris	———
28	Bl. 160, Intrudes B24	O	4	———	Partly Flexed	None	———
29	Bl. 169	?	?	Too frag. to analyze			———
30	Bl. 240	O	7	———	Partly Flexed	None	———
31	Bl. 239	F	70	1.594	Flexed	Bone awl & 2 shells	———
32	Bl. 239	M	13	———	Reburial	None	———
33	Bl. 234	F	12	———	Partly Flexed	None	———
34	Bl. 240	F	19	———	Skull only	None	———
35	Bl. 242	O	3	———	Partly Flexed	None	———
36	Bls. 233 & 234	F	20	1.633	Partly Flexed	Fea. 113 intruded w/dog burial	———
37	Bl. 240	O	17 mo.	———	Extended		———
38	Bl. 239 Assoc. B39	O	4	———	Partly Flexed	None	———
39	Bl. 239 Assoc. B38	O	7 mo.	———	Part. skull & frags. only	None	———
40	Bls. 233, 234, 239, 240	F	17	1.669	Flexed	Mano	———
	Average age		24.2				
	Average male stature			1.705			
	Average female stature			1.620			

Habitation Features

The bulk of the habitation features were refuse pits and/or areas of accumulated debris. The attempt was made to separate the 120 recorded features into meaningful categories such as pit, disturbed area, fire basin, or debris concentration, but it was not possible to establish sufficiently rigid criteria for doing so on the basis of the field notes, photographs, and drawings. Thus it was

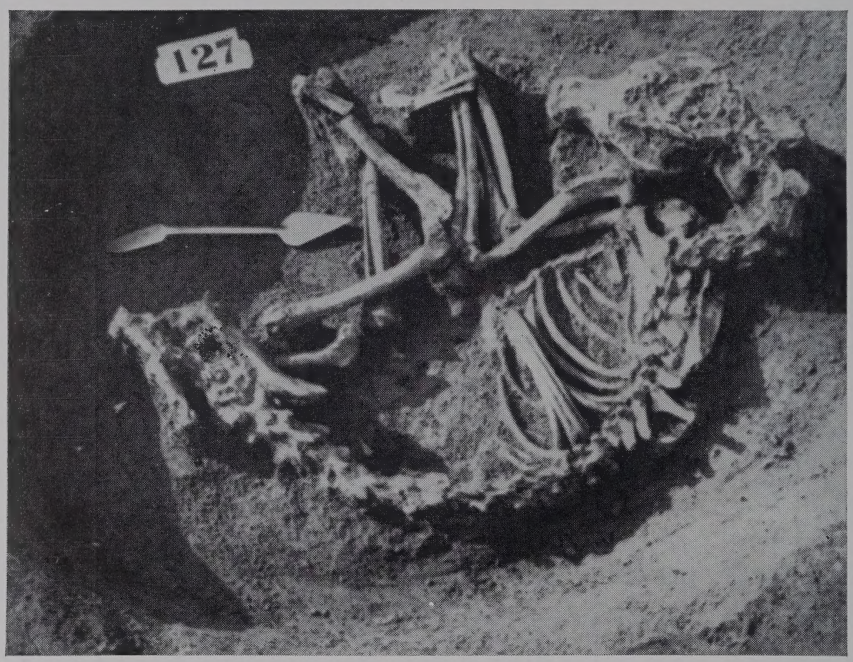


Plate XXX. Dog Burial, Bowen Site

necessary to treat each feature as equal to any other throughout the analysis. As was indicated in one description, however, there were disturbed areas with far greater evidence of aboriginal activity which were not numbered, and therefore were not treated separately in the excavation procedure, than some of those that were numbered. In some cases this was reflected in the distribution and association investigations since the well-utilized refuse pits had examples of

nearly all of the various artifactual classes while the less systematically utilized ones had only occasional items and thus few associations. Those features with few associations made some of the artifact classes appear to have distinctive distributions, but when the full refuse pits were included such distinctions and peculiarities disappeared.

The distribution of habitation features consisted of a circle some two hundred feet in diameter with the pits and fireplaces around the periphery. The center area was nearly devoid of evidence of occupation. No features were found there and very little debris, all of which was within the plough zone and on the surface. In general, the appearance was that of a camp circle. Winters reported a site in the lower Wabash Valley which appears to have a similar layout. However, his conclusion was based on surface evidence only.[22]

While the distribution of features was virtually continuous around the circle (see Fig. 14), it was apparent that there were definite areas of concentration. The southern half was more or less uninterrupted while the northern half consisted of three distinctly separate groups of features, the largest in the extreme north and two smaller ones flanking it on the east and west. Each area of features had, in addition, a number of burials.

Post holes were a considerable vexation due to the uniform soil coloration which made them extremely difficult to identify, and unlike the features they seldom contained artifactual material to help mark them. In addition, there was some rodent activity at the site which caused further confusion for the excavators. The net result was that although a substantial number of post holes were reported, it was questionable just how many of them really were post holes. Further, few of them fit any discernable pattern. The only group which suggested a structure consisted of six post holes evenly spaced around a circle seven feet in diameter. Within the circle (very nearly at the center) was a fire basin. Feature Nine

[22] Winters, *Archaeological Survey of the Lower Wabash Valley*, p. 62.

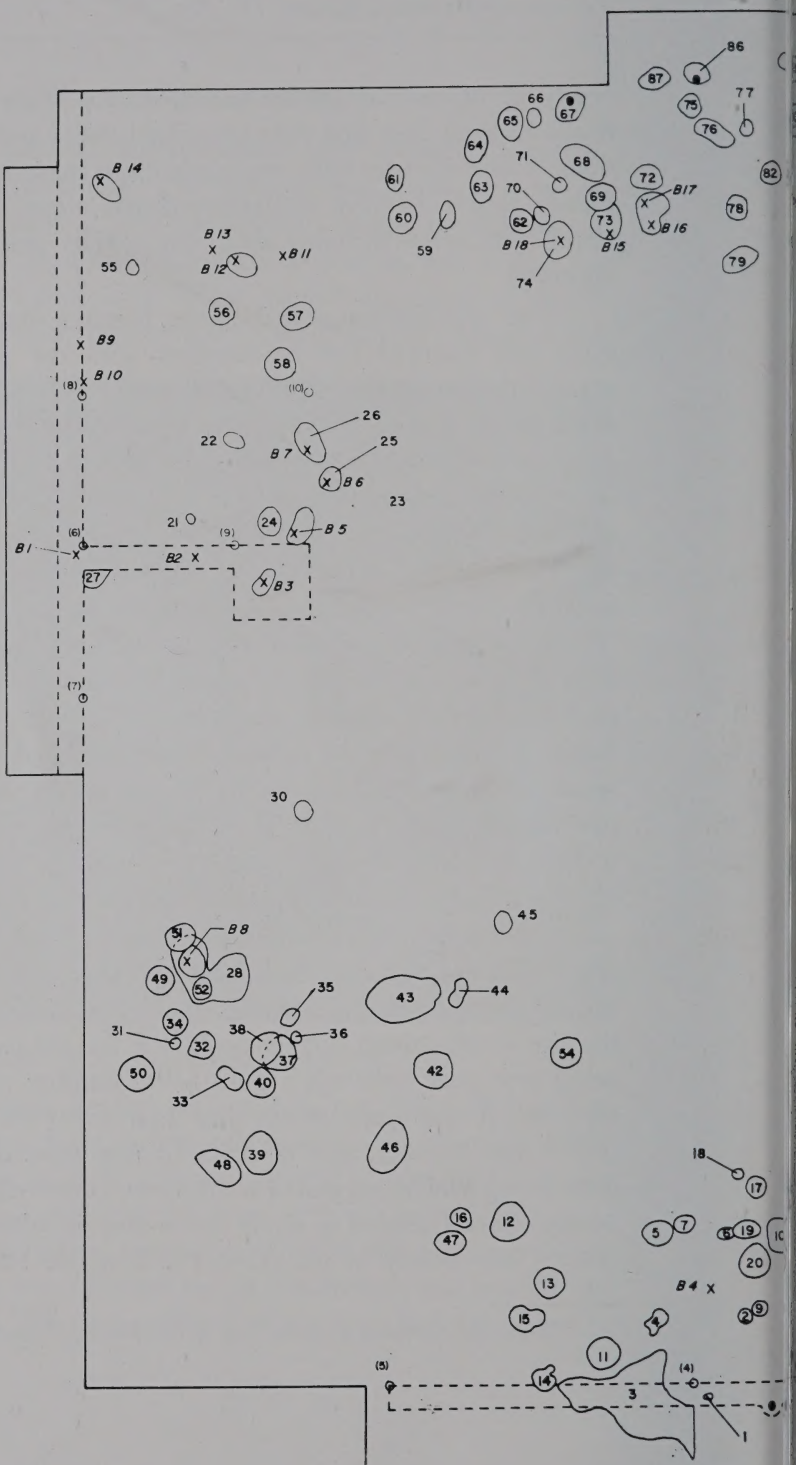
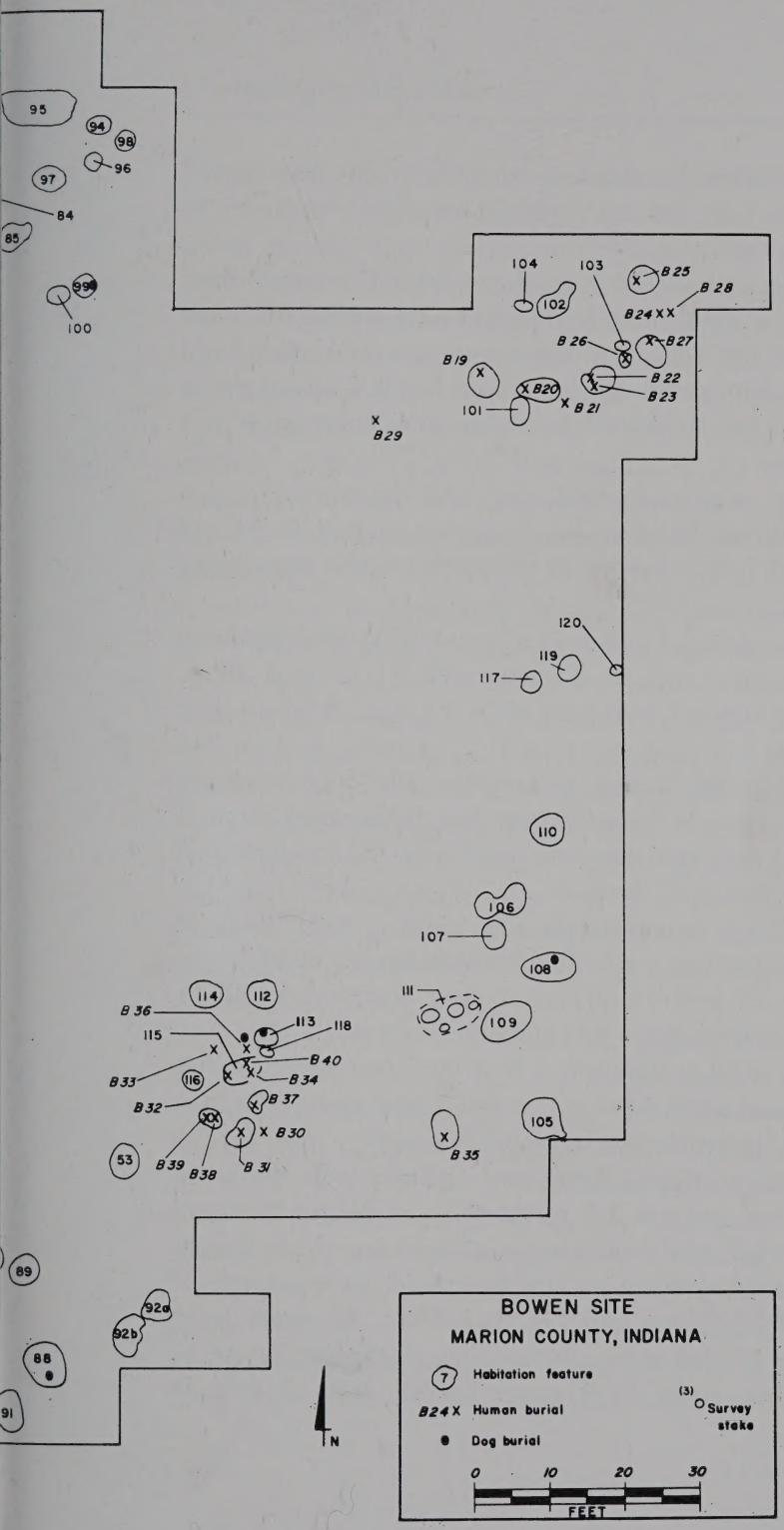


FIG. 14. DISTRIBUTION OF FEA



MAN BURIALS, AND DOG BURIALS

was also associated with the possible structure, which was located on the southern part of the site roughly ten feet west and five feet north of Stake Two.

Such a structure, if indeed it was one, would probably have been too small for a habitation; its location well within the main occupation area of the village would argue against a menstrual hut; and the fire basin would not have been inside a closed sweat lodge. All of which factors leave open the possible function of this questionable structure.

The following is a complete listing and description of the 120 numbered features. The term *in situ* when applied to burned material means that it was burned in the feature rather than being dumped into the fill.

Feature 1. An area of red burned sandy clay and charcoal, circular, approximately 1 foot in diameter and ¼-½ inch thick. Located 2 feet south and 1 foot east of Stake 4 at .8 foot below surface. No material.

Feature 2. A small, rather rectangular pile of red burned soil 2.7 feet by 1.3 feet. It extended from the .8-foot level down .4 foot. The material recovered consisted of sherds. It was located 8 feet east and 8 feet north of Stake 4.

Feature 3. A large area, amorphous in outline, .4 foot thick, of concentrated debris but not a pit. It contained much pottery, bone, and stone. Triangular points and Fort Ancient pottery were noted. It was located 3 feet west and 4 feet north of Stake 4.

Feature 4. A small shallow pit 1 foot by 2 feet located 8 feet north and 4 feet west of Stake 4 at 1.2 feet below ground surface.

Feature 5. A large circular pit approximately 5 feet in diameter located 20 feet north and 2 feet west of Stake 4. It was noted at a depth of 1.2 feet and was 2.5 feet deep. It contained abundant pottery, bone, charcoal, and shell. There was evidence of burning on the surface and extending down into the feature for an undetermined depth. Considerable shell was found in the bottom. An antler point was found in the burned area and a triangular point below it.

Feature 6. First noted as a small burned area .7 foot in

diameter at the 1.2-foot level, which developed into a pit 2.3 feet in diameter below the burning. It was located at 20 feet north and 5 feet east of Stake 4. The burning was of undetermined thickness and the pit was 1.3 feet deep. Materials in the pit included pottery, charcoal, bone, and an antler projectile point.

Feature 7. Poorly defined, definition based on differences of soil texture and the presence of white sand lenses. It appears to have been cut into by Feature 5. Materials from both features were sacked together since the dual nature of the disturbance was not noted until excavation was nearly complete. Some shell and a broken bone beamer are the only materials definitely associated with Feature 7.

Feature 8. A shallow pit located 3 feet east and 5 feet south of Stake 9. It contained no material except burial 3 in the bottom.

Feature 9. Located in the northwest corner of the block which was 20 feet west and 10 feet north of Stake 2. The feature was encountered at the 1.6-foot level and described in the field notes as follows: "Whole block was somewhat disturbed. The northeast corner of the block had several areas which showed variation in color. Some soft areas. The feature itself was dark and soft. The bottom of the southern edge was at a depth of 2.0 feet and the bottom of the northern edge went down to 2.4 feet. Little material was found in the feature." This feature was possibly associated with a small circle of post holes.

Feature 10. A well-defined pit, slightly rectangular measuring 3.75 feet east-west and 4.25 feet north-south, located 8 feet west of Stake 2 and 20 feet north. It was first encountered at 1.6 feet and had a depth of 1.4 feet. Some indications of red burned soil and ash were present at the 1.6-foot level. Ash, charcoal, shell, sherds, polished hematite, piece of copper, triangular point, shell disc, burned rocks, and a hammerstone were recovered.

Feature 11. A circular pit approximately 4 feet in diameter located 32 feet west and 4 feet north of Stake 2. It was first noted at the .8-foot level and was 2.6 feet deep. The top of the pit was dark with some ash and charcoal. Layers of ash and charcoal

alternated with layers of soil. The contents were uniformly distributed except for a heavy concentration of deer bone near the bottom.

Feature 12. An oval pit 4 feet east-west and 5 feet north-south located at 44 feet west and 20 feet north of Stake 2. It began at the .8-foot level, was 2 feet deep, and had nearly vertical walls with a rounded bottom. The fill was dark at the top but became lighter in color toward the bottom as more ash was mixed in with the debris. A considerable concentration of ash filled the bottom.

Feature 13. A debris concentration which partially overlaid a pit. Located 4 feet west and 3 feet north of Stake 2. The debris area was amorphous, approximately 7 to 8 feet across while the pit was circular and 4 feet in diameter. The debris area was encountered at the .8-foot level and had a depth of .4 foot. The pit extended 1.6 feet deeper.

Feature 14. A debris area .4 foot thick, approximately circular, and 3 feet in diameter, located at 40 feet west of Stake 2. It was cut across by the trench dug in 1959 but not seen. The fill consisted of charcoal and a number of large sherds.

Feature 15. A rather pear-shaped pit with the large end to the west and the small end to the east, located 42 feet west and 9 feet north of Stake 2. First noted at 1.2-foot level, it had a depth of 2 feet. It was slightly over 4 feet long by 3 feet wide at the large end and 1.8 feet wide at the small end. The east half was shallow, being .4 foot deep at the east wall and sloping to the west. The walls of the western half were nearly vertical and the bottom was rounded. Burned soil, ash, charcoal, shell, animal bones, sherds, and chert were found all the way to the bottom.

Feature 16. A small circular pit located 50 feet west and 3 feet north of Stake 2, 2 feet in diameter and 1.6 feet deep beginning at the 1.2-foot level. Burning was indicated at center.

Feature 17. A circular pit three feet in diameter beginning at the 1.6-foot level, shallow and basin shaped. It was located at 11 feet west and 25 feet north of Stake 2 and contained a bone beamer, sherds, and shell.

Feature 18. A small circular pit one foot in diameter, noted at the 1.6-foot level. It was located 13 feet west and 27 feet north of Stake 2 and was 1 foot northwest of the edge of Feature 17. It contained sherds, charcoal, and charred corn.

Feature 19. An elliptical-shaped pit 4 feet long and 2.5 feet wide with the long axis oriented east-west, encountered at the 1.7-foot level but its depth is unknown. It was located 14 feet west and 20 feet north of Stake 2 and filled with burned red soil, charcoal, and debris.

Feature 20. A large circular pit 5 feet in diameter and 1.6 feet deep located at 12 feet west and 16 feet north of Stake 2 at a depth of 1.6 feet. The walls were vertical and the bottom rounded. A column of charcoal approximately 1 foot in diameter extended from top to bottom of the pit in the northwest quarter.

Feature 21. A small circular pit 1 foot in diameter located at 6 feet west and 3.5 feet north of Stake 9 or in the southwest quarter of Block 2. Basin shaped, it was noted at the 1.6-foot level. It was shallow, but its exact depth is unknown. Charcoal, ash, and pottery were recovered.

Feature 22. A rather pear-shaped fired area of alternating layers of charcoal with ash and layers of clean sand and earth. It appeared to have been produced by the continuous use of the area for a fire with occasional covering over of the whole with a fresh lense of earth. Oriented east-west with a large end to the west, it was 3 feet long and 2.3 feet wide at the west end and 1 foot wide at the east end and was 1 foot thick. It was located on the line between Blocks 5 and 6, approximately 3 feet north of the south sides.

Feature 23. An elliptical pit, 5 feet long and 2.5 feet wide oriented north and south. First encountered at 1.2 feet, it extended to a depth of 2 feet. Burial 5 was located within the west edge of the pit.

Feature 24. A roughly circular pit 4 feet in diameter located near the center of Block 1. It occurred at the 1.2-foot level and had a depth of 1 foot. It contained a large number of sherds, including

a large portion of the rim of a vessel which was reconstructed. It had a moderately everted rim and was decorated with three horizontal rows of close-set impressions.

Feature 25. A circular pit approximately 4 feet in diameter. First noted at the 1.2-foot level, it was 1.1 feet deep and contained Burial 6.

Feature 26. An oval-shaped pit nearly 5 feet long and 3 feet wide. It was oriented slightly west of north and contained Burial 7 along the west edge. The feature was encountered at 1.2 feet and had a depth of 1.4 feet.

Feature 27. Part of a pit located in the northwest corner of Block 13. In 1959 test trenches of work area B cut through the north and west halves of this feature but it was not noted at that time. Only the southeast quarter was recorded. That quarter appeared to have been part of a large rather circular pit. It was noted at the 1.6-foot level and was .8 foot deep. There was little material in it.

Feature 28. A large, generally disturbed area in Blocks 18 and 19 which began at .8 foot and was 2.4 feet deep at its deepest part. The horizontal plan was irregular and depths varied from .4 foot to the 2.4-foot level. It was suspected that this was an area of considerable prehistoric activity with overlapping and intrusive pits, but field notes were not detailed enough to sort them out. Large quantities of debris were recovered.

Feature 29. A large pit 3.5 feet in diameter and 4.5 feet deep, located nearly a hundred yards east of the main portion of the site. There was an extremely heavy concentration of charcoal in the 3.0-3.5-foot level and a few pieces of bone. From 3.5 to 4.5 feet there was a heavy concentration of snail shells. The pit was basin shaped at the bottom and fire-cracked stones lined the charcoal level.

Feature 30. A circular pit 2.5 feet in diameter located in the east-central part of Block 21 at the 1.2-foot level. It was only about .4 foot deep and filled with ash and charcoal and burned soil. The wood was incompletely burned suggesting that dirt was

thrown over the fire before it was through burning. There was very little debris.

Feature 31. A small circular charcoal area 1.5 feet in diameter, located in the west-central portion of Block 26. Noted at the .4-foot level it was 1 foot deep and contained some bone and other miscellaneous materials. It lay .3 foot northwest of Feature 32.

Feature 32. A circular pit 4 feet in diameter encountered at a depth of .8 foot in the center of Block 26. The bottom of the pit was lined with ash and contained miscellaneous debris. The pit was 2.7 feet deep.

Feature 33. A circular charcoal area approximately 3 feet in diameter located in the southeast corner of Block 26. It was first noted as an undefinable concentration at the .4-foot level but was clearly defined at the .8-foot level. The depth was only .6 foot below the .8-foot level.

Feature 34. A rectangular pit 3 feet wide by 4 feet long oriented northwest-southeast in the northwest corner of Block 26 at a depth of .8 foot. Apparently during the filling of the pit, fires were built at various times as a number of burned layers occurred. An ash layer occurred 2 feet down in the pit which was 2.7 feet deep in all. A considerable amount of debris was present.

Feature 35. A shallow pit defined at the .8-foot level in the northeast corner of Block 27. It was rather rectangular in shape, 3.5 feet long and 2 feet wide oriented northeast-southwest, with a depth of 1 foot. The contents included miscellaneous material as well as a ground-stone ball. It appears it was a fire pit first, lined with charcoal and burned soil. It was then partially filled with debris and a layer of clean dirt spread over the debris, then more debris accumulated on top of the clean dirt, completely filling the pit.

Feature 36. A red burned area, circular, 2 feet in diameter, located in the east-central part of Block 27, at a depth of .8 foot. It was .4 foot deep, basin shaped, and filled with charcoal, burned soil, and sherds.

Feature 37. A rather large area of concentrated debris in the

center of Block 27 at the .8-foot level. It was oval in plan, 8 feet long, 5 feet wide, and .8 foot thick. Deer antler, sherds, shell, heat-cracked stone, a bone beamer, and some charcoal were found in it. Feature 38 lay at the west end and intruded into the debris area.

Feature 38. A circular pit 3.5 feet in diameter located within Feature 37 at the west end of the latter. It was 2.4 feet deep, thus extending through the debris layer that was Feature 37 and into the sterile soil beneath. The fill of Feature 38 consisted of miscellaneous material, charcoal, shell, sherds, ash, and a bone beamer. Thin layers of burned red soil, ash, and yellow soil made up most of the fill in the bottom. The lower third of the pit flared out into a bell-shaped pit.

Feature 39. A circular pit nearly 4 feet in diameter located in the southwest corner of Block 29. It was straight sided and flat bottomed extending from the .8-foot level to the 2.8-foot level making the pit two feet deep. Considerable debris was found including shell, charcoal, animal bones and teeth, fish bones, body and rim sherds (including a large section of a single pot), a triangular point, burned rock, chert chips, charred corn and some ash. The pot, large, grit tempered, and cord marked, had a flattened globular form and flaring smoothed rim with plain rim fold.

Feature 40. A circular pit 4 feet in diameter located in the southwest corner of Block 27 and northwest corner of Block 29. First defined at the .8-foot level, it was 2.6 feet deep and contained considerable debris in the form of sherds, charcoal, animal bones, shell, triangular points, and ash. Alternating layers of debris and sterile yellow soil indicated either periodic use of the pit for disposal of refuse, with dirt put in to cover the refuse each time, or long intervals between use. Four deer scapulae, a hammerstone, and a bone pin were also recovered.

Feature 41. A roasting pit located 110 feet north and 40 feet west of Stake 6. It contained ash, charcoal, and large quantities of heat-cracked rock. No dimensions were recorded.

Feature 42. Essentially a circular pit located in Blocks 35 and 36 but primarily toward the eastern edge of Block 36. The diameter

was 5.7 feet and the depth was 1.5 feet beginning at the .8-foot level. The fill was largely shell and ash, but also included numerous other items such as triangular points, heat-cracked rock, sherds, animal bones, fish bones, worked slate, bone beamers, an awl, and considerable charcoal. This was a large pit with walls vertical to a depth of 1 foot at which point they began to taper in, forming a basin-shaped bottom. Shell was particularly thick in a 6-inch layer just below plow zone and in the southeast half of the feature.

Feature 43. A large disturbed area at the juncture of Blocks 31, 32, 36, and 37. It was 10 feet long and 6 feet wide, and oval in outline except for a 3-foot wide projection which extended 2 feet to the northeast from that margin. The orientation of the feature along its long axis was east-west. It was noted first at the .8-foot level and had a depth of approximately .8 foot. It was filled with charcoal and flecked red burned soil. The feature was not a pit but a shallow depression. It contained many small holes which extended from 1 to 4 inches below the feature. They may have been post holes but there was no discernable pattern to them. The holes were filled with the same red burned soil and charcoal of the feature and either predate or were contemporaneous to the latter.

Feature 44. A violin-shaped, shallow disturbance located primarily in the southeastern corner of Block 37 but extending slightly into Blocks 36 and 42. It was noted at the 1.2-foot level and had a depth of .6 foot. The fill consisted primarily of very dark organic soil and charred corn.

Feature 45. A circular pit, 3 feet in diameter, on the line between Blocks 41 and 42 midway between the east-west borders of the blocks. It was noted but not definable at the .8-foot level and defined at the 1.2-foot level, having a depth of 1.2 feet. A hammerstone, bone, shell, and charred corn were in the dark organic fill.

Feature 46. First noted at the 1.2-foot level as a large oblong disturbed area oriented with the long axis northeast-southwest at the juncture of Blocks 30, 35, 46 and an unnumbered block of the 1960 excavation. It was 6.7 feet long and 5 feet wide. Excavation

to the 1.6-foot level showed the southwest portion of the feature was simply a shallow debris area probably spread outward from the original pit. The latter was actually located in the northeast two thirds of the originally defined feature. This pit was circular, 4.5 feet in diameter, and extended to slightly below the 3.6-foot level. If the 1.2-foot level was the original surface of the pit, it was then 2.4 feet deep. The pit was dug by levels:

1.2-1.6: Southwest third of whole feature shallow with little debris, and northeast two thirds pitlike in appearance with considerable debris. Contents included Fort Ancient and cord-marked sherds lying in vertical or semivertical positions, some reddish burned soil, and the bit of a celt.

1.6-2.0: Charred corn, sherds, cracked rock, and chert, with frequent vertical placement. Burning did not extend to this level but there were some large pieces of charcoal.

2.0-2.4: Poll end of the broken celt along with charred "nuts" and other debris.

2.4-2.8: Heat-cracked stone and some charred corn.

2.8-3.2: A reddish burned ring which circled the wall of the pit and a layer of charcoal and ash at the 3-foot level; more charred corn and considerable heat-cracked stone.

3.2-3.6: Still more charred corn and heat-cracked rock. Burning reached to 3.6-foot level.

3.6 plus: The floor of the feature which was lined with heat-cracked rock and large pieces of charred wood. The entire flat bottom showed heavy burning in the form of ash and reddened soil.

Feature 47. A circular pit 3 feet in diameter located in the northeast corner of Block 50. It was defined at the 1.6-foot level and extended to the 3.5-foot level, having a depth of 1.9 feet. Red burned soil and charcoal occurred at the 2.0-2.6-foot level with most of the debris immediately below it.

Feature 48. An oblong pit approximately 6 feet long and 4 feet wide with the long axis northwest-southeast. It was located principally in the northeast corner of Block 44 but also extended into Blocks 28 and 45. Clearly defined at the 1.2-foot level, it was

very shallow extending only to the 1.7-foot level, making it only .5 foot in depth. It was packed with debris including by far the greatest number of shell-tempered sherds found in a feature.

Feature 49. A circular pit some 3 feet in diameter located near the south edges of Blocks 18 and 72. It was defined at the 1.6-foot level and extended to the 2.5-foot level, a depth of .9 foot. It was full of debris including a reconstructable small cord-marked pot, which was coarse and fairly thick.

Feature 50. A circular pit located on the east side of Blocks 70 and 71. Four feet in diameter, it was defined at 1.2 feet and extended to the 3-foot level for a depth of 1.8 feet. Ash and charcoal were found but a lack of burned soil suggests these were not the result of *in situ* burning. There was very little debris until the 2.4-2.8-foot level which was packed.

Feature 51. A circular pit located in Block 18 at the north edge of and within Feature 28. Feature 51 and Burial 8 postdated Feature 28, being clearly intrusive. Feature 51 was 3.5 feet in diameter and was differentiated at the 2.8-foot level although the area was earlier noted as an undefined debris area in Feature 28 at the 1.6-foot level. It extended to a depth of 3.6 plus feet and was at least 2 feet deep although only the material from below the 2.8-foot level was recorded as from Feature 31.

Feature 52. Located at the south edge of and within Feature 28 in Block 18. Noted at the 2-foot level, it consisted of red burned soil, white wood ash, layers of debris filled soil, and a concentration of burned bone. It was basically circular in plan but with the northeast quadrant missing. During excavation Robert Kiste and John C. Householder worked out a sequence involving first Feature 28, then 52, 51, Burial 8, and finally a small fired area above Burial 8 which was not designated by a number.

Feature 53. Located in Block 78. At the .8-foot level this appeared to be a circular pit 4 feet in diameter. Actually it disappeared at slightly over 1.2 feet and was nothing more than a slightly disturbed area. The circular nature was doubtful.

Feature 54. Like Feature 53, a shallow debris area. Located

in Block 84 at a level of 1 foot, it terminated at the 1.2-foot level. The feature form shows a very regular 4-feet-in-diameter circle, which was probably not very accurate. The only notable item recovered was charred corn.

Feature 55. A small pit located in Block 87. First noted as a charcoal area at the .8-foot level, it was circular, 1.5 feet in di-

Plate XXXI. Feature 60, Bowen Site, during Excavation. Note layer of heat-cracked rock.

ameter, and .8 foot deep. It contained much charcoal, charred corn, and a reconstructable vessel, as well as other debris.

Feature 56. A circular pit 3.5 feet in diameter located primarily in Block 88 but extending slightly into 89, 95, and 96. It was defined at the 1.2-foot level. Beginning at the 2.8-foot level it belled outward. There was considerable fire-cracked rock, and at the 3.2-3.6-foot level there were charred logs among the rocks. Three of the

logs were in relatively good shape. The total depth was 2.4 feet.

Feature 57. A circular pit located in Blocks 89 and 96 at the east edge, four feet in diameter. Defined at the .8-foot level, it reached to 1.6 feet for a depth of .8 foot. The most important element was a mortar at the .8-1.2-foot level.

Feature 58. A pit outlined and defined at the 1.6-foot level in the southeast corner of Block 96. There was evidence of it at the .8-foot level but it was not definable and it terminated at the 2.0-foot level. It had straight sides, a flat bottom, and contained but little debris.

Feature 59. An approximately circular basin-shaped pit located in the southeast corner of Block 100 at the .8-foot level. It extended to the 1.6-foot level. A large amount of shell was found at the .8-foot level. There was some red burned soil and ash around the periphery with two heat-cracked stones and a small amount of other material. It was probably a fairly deep fire pit which was later used as a refuse pit.

Feature 60. A circular pit in the southwest corner of Block 100, defined at the .8-foot level and extending to the 3.2+-foot level. It held considerable debris along with ash and burned earth. The walls and bottom of the pit had an inch-thick layer of burned earth. At the 2.8-foot level a layer of cracked rock occurred. Corn underlay the rock.

Feature 61. An elliptical pit approximately 2.5 by 3.5 feet, located in northwest corner of Block 100 at .8-foot level. The sides were heavily burned. At the 2.4-foot level it was lined with large heat-cracked rocks. Below the rocks were charred logs about 4 to 6 inches in diameter laid parallel to each other across the pit in a north-south direction. Corn was found among logs. The bottom was at the 3-foot level.

Feature 62. A circular pit 3 feet in diameter in the southeast corner of Block 101 at 1.2 feet and extending to the 2.4-foot level. This was a refuse pit with much debris, ash and burned earth, as well as a metate measuring 1.6-2.0 feet, and .4 foot thick. A burned layer occurred at approximately the 1.6-foot level.

Feature 63. A circular pit three feet northwest of Feature 62 in the center of Block 101. Defined at 1.2 feet, it extended to the 2.4-foot level and was 3.5 feet in diameter. The bulk of the pit was simply refuse but at the 1.2-foot level a small (1.2 feet in diameter and .6 foot deep) fire pit occurred within the feature.

Feature 64. Basically a circular pit 3 to 4 feet in diameter, located in the southwest corner of Block 108 at the .8-foot level and

Plate XXXII. Feature 61, Bowen Site, during Excavation. Note charred logs.

extending to the 2.4-foot level. It contained debris, but there was no evidence of burning.

Feature 65. A circular pit 3 feet in diameter located 2 feet northeast of Feature 64 in center of Block 108 at the .8-foot level and extending to the 2.6-foot level. There were large quantities of heat-cracked stone between the .9-and 1.6-foot levels with burned earth and ash. From 1.8 to 2.6 feet there was more shell than dirt. The bottom half of the pit was filled with shell.

Feature 66. A circular, straight-sided pit with flat bottom, located at midpoint of the line between Blocks 108 and 109 at the .8-foot level, extending to the 1.6-foot level, 2.5 feet in diameter. There was no evidence of burning.

Feature 67. A square pit 2.8 feet by 2.8 feet, defined at the .8-foot level in north center of Block 109. Straight sided with a depth of .8 foot or to the 1.6-foot level, it contained very little debris, but at the 1.2-1.6-foot level was a dog burial.

Feature 68. An irregularly shaped refuse pit on the line between Blocks 106 and 109. Located at the .8-foot level and extending to 2.4 feet, it was 6 feet along northwest-southeast axis and 4 feet northeast-southwest. It showed no burning, but contained considerable debris.

Feature 69. A circular pit 4 feet in diameter located on the line between Blocks 106 and 115, only a small part extending into 115. Defined at the .8-foot level it extended to the 3.2+-foot level. There were refuse pits with evidence of burning and considerable ash at the 2-foot level. It was not a fire pit, however. It had straight sides and a flat bottom.

Feature 70. A circular pit 2.5 feet in diameter located in the southwest corner of Block 106, defined at the .8-foot level and extending to the 1.6-foot level. It was basin shaped.

Feature 71. Primarily a circular charcoal area 2 feet in diameter located 2 feet northeast of Feature 70 in Block 106. Defined at the .8-foot level it extended to the 1.6-foot level. It was unusual for a charcoal area in that it contained some refuse. It was basin shaped.

Feature 72. An elliptically shaped, very shallow charcoal and debris area located in the north central part of Block 115. Defined at the .8-foot level it extended to the 1.2-foot level. It was basin shaped but probably was not of intentional construction.

Feature 73. A debris area in the southeast corner of Block 106 and southwest corner of Block 115. Burial 15 was found at the 2-foot level extending well outside the originally defined limits. The area was interpreted as follows: A large shallow disturbed area extending from Block 115 across 106 and into 109 was

created sometime after Burial 15 had been placed in a pit at the southeast corner of Block 106 and southwest corner of Block 115. The disturbance destroyed all evidence of the top part of the burial pit. At a later date Features 68 and 69 were intruded into the central and northern portions of the generalized disturbed area. Sequence: Burial 15 first, Feature 73 second, Features 68 and 69 third.

Feature 74. A circular pit 4 feet in diameter located on the mid-line between Blocks 105 and 106. It was defined at the .8-foot level and terminated at the 2-foot level. Burial 18 was placed in the bottom. Some small amount of debris was included in the fill. The pit was straight sided with a basin-shaped floor.

Feature 75. A circular pit in the northwest corner of Block 117, extending very slightly into 114. Defined at the .8-foot level and extending to the 1.6+-foot level it had straight walls and a basin-shaped floor. It was a refuse pit three feet in diameter.

Feature 76. Associated with Feature 77. Located in the center of Block 117, it was defined at the .8-foot level. Its west end reached a depth of 1.6 feet while the east end sloped up to a high spot separating Feature 76 from Feature 77. Oblong and irregularly shaped, trending northwest-southeast, it was five feet long and three feet wide. It contained debris and charcoal but showed no *in situ* burning.

Feature 77. The east part of the disturbed area in the center of Block 117. Actually it was northeast of the southeast end of Feature 76, the two making an L-shaped pattern. It was circular, two feet in diameter, with depth to the 1.6-foot level. It was connected to Feature 76 by a shallow disturbed area.

Feature 78. A circular pit 2.5 feet in diameter, located at the 1.2-foot level, slightly southeast of the center of Block 118. It extended to the 2.8-foot level. There was debris in the fill with slight evidence of burning, probably not *in situ* burning. There were seven charcoal areas, each 1 foot in diameter, around Feature 78; there was no discernable pattern to them.

Feature 79. A pit, oval in plan, 5 feet northeast-southwest by

3 feet northwest-southeast, located in the east center of Block 119 at the .8-foot level. The west half reached to the 1.2-foot level and the east half to the 2.4-foot level. It was a refuse pit with the west half sloping to the deeper east half, which was basin floored and straight sided. It was probably a pit one side of which had caved in.

Feature 80. A large shallow disturbed area, probably not a pit. Located in the east central part of Block 120 at the .8-foot level it ended at the 1.6-foot level. It had a slight extension into Block 122. It was oval in plan, trending northeast-southwest, its long axis 5 feet, short axis 3 feet. There was no *in situ* burning.

Feature 81. A small (1 foot in diameter), circular charcoal and debris concentration located 1 foot south of Feature 80 in Block 120. Defined at the .8-foot level, it ended at the 1.2+-foot level but with heavy burning extending deeper. It was a fire basin with some debris in the fill.

Feature 82. A circular debris area 2.5 feet in diameter in the northwest corner of Block 121. Defined at the .8-foot level it extended to the 1.4-foot level. It was basin shaped but due to excavation rather than construction. It contained some burned soil and ash.

Feature 83. A circular pit, 1 foot in diameter located in the east central part of Block 121 at the .8-foot level extending to the 2.4-foot level. There was some *in situ* burned soil around the straight walls and on the rounded bottom.

Feature 84. A very shallow basin located in the center of Block 122, defined at the .8-foot level and ending at the 1.2+-foot level, circular, 2.25 feet in diameter. It contained a dog burial and little debris.

Feature 85. A broad shallow basin at the east of the line between Blocks 122 and 123. Defined at the .8-foot level, it extended to the 1.6-foot level, was basically circular, and 4 feet in diameter.

Feature 86. Circular refuse pit 4 feet in diameter, located in the southwest corner of Block 124. It was defined at the .8-foot level

and extended to the 2-foot level. Basin-shaped, it included much deer bone and a dog burial.

Feature 87. An oval-shaped shallow pit or refuse concentration located at the mid-point of the line between Blocks 125 and 114, lying mostly in 125. Defined at the .8-foot level it extended to the 1.6-foot level. It trended east-west, and was 4.75 feet long by 3 feet wide. It had a basin-shaped floor and showed no evidence of firing.

Feature 88. A very large pit located nearly equally in Blocks 128, 129, 130, 131. Defined at .8 foot it extended to the 2.6-foot level. It was basin shaped, somewhat squarish in plan, and measured 7 feet east-west, and 6 feet north-south. It showed no evidence of *in situ* burning, but contained considerable refuse and a dog burial.

Feature 89. A circular pit 4 feet in diameter located in the southeast corner of Block 127. It was discernable at .4 and .8 foot but not defined until the 1.2-foot level, and extended to the 4.4-foot level. It was straight sided and had a basin floor. It was a combination refuse pit and fire basin, the latter at the 2.4-foot level, built when the pit was about half full of debris.

Feature 90. A circular pit 4 feet in diameter located in the west-central part of Block 127. Its east edge was 1 foot from the west edge of Feature 89. Defined at the 1.2-foot level, it extended to the 3.6+-foot level. Its walls flared outward from the 2.6-foot level making a bell-shaped pit. It contained much debris including ash and red burned soil, but the mixed nature suggested the latter was refuse from elsewhere and not the result of *in situ* firing.

Feature 91. Oval shaped with basin-shaped sides and bottom, probably a debris area rather than pit. Located in the center of Block 131 at the 1.2-foot level, it extended to the 1.6-foot level. Its general outline was visible at .8 foot but not definable. It was 4.5 feet wide by 5.75 feet with its long axis northwest-southeast.

Feature 92. Actually two features which were clearly separated at the 1.6-foot level and below but which when originally defined at the .8-foot level appeared to be a single albeit irregularly shaped

feature. 92(a) was located in the north-central part of Block 132 and was circular, 4 feet in diameter, with straight sides and a flat bottom. 92(b) was located in the west half of Block 132 and slightly in Block 129, was kidney shaped with the long axis north-south 6 feet and east-west 4 feet and had a basin-shaped bottom. 92(a) went to the 3.2-foot level and (b) to the 2.4-foot level. A ridge .5 foot wide and extending up to slightly above the 1.6-foot level separated the features. Both contained refuse; neither had much ash nor showed any evidence of *in situ* burning.

Feature 93. Like Feature 92, actually two pits. They were jointly defined at the .8-foot level in the south half of Block 126 but could not be separated even at lower levels. The flat bottoms were at the 2-foot level, the sides were slightly basin-shaped. There was no evidence of burning and very little debris.

Feature 94. A circular shallow basin 3 feet in diameter located at the mid-point of the line between Blocks 136 and 139. Defined at the .8-foot level it extended to the 1.2-foot level. Some large sherds of a partially reconstructed pot were recovered.

Feature 95. A very large oval-shaped basin located at the north end of the line between Blocks 135 and 136, 10.5 feet east-west, 7 feet north-south. Defined at the .8-foot level, it extended to the 1-foot level in the center but slightly deeper at each end: to the 1.4-foot level at the east end, the 1.2 at the west end.

Feature 96. A circular pit, 2 feet in diameter, on the east end of the line between Blocks 136 and 140. Defined at the .8-foot level and extending to the 2+-foot level it had straight sides and a flat bottom. Considerable shell was found at the bottom, and some ash but there was no *in situ* burning. It was a refuse or storage pit.

Feature 97. An oval, basin-shaped disturbed area, defined at the .8-foot level and extending to the 1.6-foot level. It was located at the northwest corner of Block 140. It measured five feet east-west and 3.5 feet north-south. There was no evidence of burning. It probably was simply a concentration of debris rather than a pit.

Feature 98. A circular, basin-shaped, shallow pit in the southwest corner of Block 139, 2.75 feet in diameter, defined at the .8-

foot level and extending to the 1.6-foot level. It was intruded on the west by a charcoal concentration. The field notes offer no further comment or interpretation.

Feature 99. A circular, basin-shaped pit 3 feet in diameter defined at the .8-foot level and extending to the 1.6+-foot level. It was located at the southeast corner of Block 141. A dog (skull only) was noted at the 1.4-foot level. It may have been a fire basin since it was lined with red burned soil.

Feature 100. A circular, basin-shaped pit 3 feet in diameter located .5 foot southwest of Feature 99 in Block 141. It was defined at .8 foot and extended to 1.6 feet. Since there was evidence of much burning, it was probably a fire basin.

Feature 101. An oval pit 4.5 feet north-south by 2.74 east-west located in the center of Block 155. Defined at .8 foot, it extended to 2 feet. There was no *in situ* burning. It was a refuse and/or storage pit with a small amount of debris.

Feature 102. A large, shallow basin-shaped area in Blocks 157, 159, and 162, which had a much smaller and deeper pit extending through it at the south end of the line between Blocks 159 and 162. The basin was kidney-shaped in plan trending northeast-southwest, 6 feet long by 3 feet wide and was defined at .8 foot and extended to 2 feet. The deeper pit was at the southwest end, was 1.5 feet in diameter, and extended to the 3.6-foot level. The whole was reminiscent of the so-called "bathtubs" of various Mississippian sites. There had been no *in situ* burning.

Feature 103. A small (1 foot in diameter) circular basin containing charcoal and having a red burned-earth lining, probably a fire basin. Defined at the 1.2-foot level, it extended to the 1.6-foot level. It was located exactly at the mid-point of the line between Blocks 157 and 160.

Feature 104. A small shallow basin, circular, 2 feet in diameter located at the .8-foot level just 1 foot west of Feature 102 in Block 162. There was no evidence of burning. It extended down 1.2+ feet.

Feature 105. A circular pit 3 feet in diameter, located toward

the south end of the line between Blocks 243 and 244. Defined at 1.2 feet it extended to 2.4 feet. It held considerable debris including ash and charcoal but no burned soil. This probably was a refuse and/or storage pit. It had approximately straight walls and a rounded bottom.

Feature 106. Actually two pits which at the .8-foot level appeared to be one. Defined at 1.6 feet, both extended to 2.4 feet. The west pit apparently intruded slightly into the eastern one. They were located in the south half of Block 214 and extended very slightly into the north edge of Block 227. Both were straight walled and flat bottomed.

Feature 107. A circular pit located in the northwest part of Block 227. It was defined out of a generalized debris area at the 1.6-foot level and extended to the 2.8-foot level. It held considerable debris, including two large portions of pottery vessels. There had been no *in situ* burning. It had straight walls and a basin-shaped bottom.

Feature 108. A circular pit 2.5 feet in diameter extending down out of a debris area which was defined at the .8-foot level. The pit was defined at the 1.2-foot level and extended to the 1.6-foot level. It was basin-shaped and included a dog burial.

Feature 109. A large amorphously shaped, disturbed area with debris, located in the central part of Block 233. It appeared to be a series of constructions, the first or earliest of which was a shallow oval basin which extended from the .8-foot level down to the 1.6-foot level. The second, a trench somewhat deeper than the basin, cut through it in a northwest to southeast direction. The trench was approximately 10 feet long, 2 feet wide, and extended to a depth of 2 feet. The third disturbance was a charcoal area located toward the northwest end of the trench and entirely within it. It did not appear to be a wall trench, nor was the charcoal area the remains of a post.

Feature 110. A circular pit, 4 feet in diameter located at the juncture of Blocks 211, 212, 213, 214, defined at the .8-foot

level and extending to the 3.2-foot level. It had straight walls, a flat bottom, and showed no *in situ* burning.

Feature 111. Insufficient documentation for description. The only drawing is from the .8- to 1.2-foot level and the written description suggests considerable variation from this drawing but does not give enough detail more than to suggest that several elements were involved.

Feature 112. A circular pit 4 feet in diameter located at the east end of the line between Blocks 233 and 224. It was defined at the .8-foot level and extended to the 4.2+-foot level. The walls were straight and the bottom basin-shaped. There was burned soil on the walls and floor which indicates use as a fire pit as well as refuse pit.

Feature 113. A rather amorphous disturbed area located in the southwest corner of Block 233. At the .8-foot level from the notes and drawings, it was completely nondescript. At the .8-to 1.2-foot level there was a dog burial and at the 1.2-1.6-foot level a human burial. Most importantly there was a shell-tempered, cord-marked Bowen Sharply Everted Rim vessel (large part) found in association with the Burial 36.

Feature 114. A circular pit 3.25 feet in diameter located in the north central part of Block 234 and extending slightly into 233. Defined at 1.2 feet, it extended to 2.4 feet. It had straight walls and a flat bottom, and showed no *in situ* burning.

Feature 115. A large circular pit approximately 6 feet in diameter at the juncture of Blocks 233, 234, 239, and 240. Defined at 1.2 feet, it extended to 2.6 feet. It had straight walls for 2 feet which then belled out, and a basin-shaped bottom. There was no *in situ* burning.

Feature 116. A circular pit, 3 feet in diameter and basin-shaped, located in the northwest corner of Block 239. It was defined at 1.2 feet and extended to 2.4 feet. There was no *in situ* burning.

Feature 117. A circular pit, 3 feet in diameter at the east end of the line between Blocks 195 and 198. Defined at 1.2 feet, it extended to 2.6 feet. It contained a bone fishhook (the only one

found at the site). It had straight walls belling between the 2.0- and 2.6-foot levels and a rounded bottom. There was no *in situ* burning.

Feature 118. A small (2 feet in diameter) circular, basin-shaped pit next to Feature 113 in the southwest corner of Block 233. It was defined at the 1.6-foot level. It had an intrusive relationship to Feature 113 which could not be determined either from photographs or field notes. It extended to the 2.4-foot level.

Feature 119. A circular pit 3.5 feet in diameter, located in the southwest corner of Block 196. It was defined at the 1.2-foot level and extended to the 3-foot level. It was bell shaped with a rounded bottom and showed no *in situ* burning.

Feature 120. Small (1 foot in diameter) circular, basin-shaped pit located at the southeast corner of Block 196. It was defined at the .8-foot level and extended to the 1.4-foot level. Included in it were three deer scapulae. A layer of burned soil formed its outer edge. It was probably a fire basin.

PART III

INTERPRETATIONS AND CONCLUSIONS

INTERPRETATIONS AND CONCLUSIONS

Distributional Analysis

In order to ascertain distributional information in regard to the cultural remains, the primary unit utilized was the habitation feature. The reason for this was that virtually all of the material was from either the features or the plough zone. In the latter case distribution was greatly disrupted by the many years of recent agricultural activity. It appeared that much of the surface and plough zone material was from features which had been cut into by the plough and brought to the surface. Thus the undisturbed portion of the feature seemed to be the logical distributive unit rather than the excavation squares. As a case in point, there were 4,375 sherds in the computerized study. Of these, 2,210 were from squares and 2,165 from features. However, 1,607 of the sherds from the squares were definitely from the plough zone and the top of the undisturbed soil. Only 111 sherds were definitely from below the plough zone and outside of a feature. Obviously little was lost by using the feature as the distributive unit.

Edge-punched cards were prepared, one for each feature, and a punching code established. The kind of card used was the Unisort Analysis Card, Form Y9, Burroughs Corporation–Todd Company Division-L Hadley. This particular card had ninety-one numbered holes and six unnumbered holes which could be punched and then sorted with knitting needles. It had only a single row of holes around the perimeter making storage of quantifications information limited to what was written on the card itself. In other words, only the presence or absence of an artifact was noted in the punched holes.

Nearly all ninety-seven holes were utilized in the distribution study. The following list is the hole code and is presented here to indicate those items which were included in the distributive studies.

TABLE 18. *Feature Sheet Codes*

Number refers to a hole number on the Unisort Card

BONE

1. Beamer
2. Awl
3. Flaker
4. Needle
5. Pin
6. Pendant
7. Spatula
8. Other bone artifacts
9. Unworked bone
10. Open

ANTLER

11. Cut tine
12. Projectile Point
13. Pendant
14. Flaker
15. Other antler artifacts
16. Open

STONE

17. Triangular Unnotched Projectile Point
18. Triangular Notched Projectile Point
19. Stemmed Projectile Point
20. Other Projectile Point
21. Drill
22. Scraper
23. Primary decortication flakes
24. Secondary decortication flakes
25. Secondary chipping
26. Cores
27. Other chipped stone artifacts
28. Blanks
29. Mano
30. Mano and anvil
31. Mano, anvil, and hammerstone
32. Anvil
33. Hammerstone
34. Metate
35. Celt
36. Sandstone abrader (grooved)
37. Other ground stone artifacts
38. Open
39. Heat-cracked stone
40. Burned limestone

MISCELLANEOUS ITEMS

41. Cut shell
42. Other artifacts
43. Burned clay
44. Unworked stone
45. Unworked mussel shell
46. Aquatic snail shell
47. Terrestrial snail shell
48. Unworked antler
49. Human burial
50. Dog burial
51. Clay pipe
52. Charred corn
53. Nuts
54. Good C14 sample

POTTERY

55. Oliver Cord-marked: Incised pottery
56. Oliver Cord-marked: Plain pottery
57. Bowen Cord-marked: Cord-impressed pottery
58. Bowen Cord-marked: Punched pottery
59. Bowen Cord-marked: Plain pottery
60. Bowen Everted Rim pottery
61. Bowen Fabric-Marked pottery
62. Bowen Collared: Cambered Rim pottery
63. Bowen Collared: Straight Rim pottery
64. Shell-tempered pottery
65. Blank
66. Blank

UNMODIFIED FAUNAL REMAINS (COMMON NAME)

67. Deer
68. Turkey
69. Raccoon
70. Fish
71. Turtle
72. Squirrel
73. Woodchuck
74. Elk
75. Beaver
76. Rabbit
77. Bear
78. Mallard
79. Frog
80. Other mammals
81. Other birds

TABLE 18. *Feature Sheet Codes*—continued

Number refers to a hole number on the Unisort Card

82. Dog other than burial

SIZE OF FEATURE

83. Less than 2 ft. across
84. 2-4 ft. across
85. More than 4 ft. across

PROFILE OF FEATURE

86. Straight sides and flat bottom
87. Straight sides and basin-shaped bottom
88. Bell shaped
89. Basin-shaped with no marked side wall

SHAPE OF FEATURE IN PLAN VIEW

90. Circular
91. Rectangular

(If other shape neither 90 or 91 will be punched.)

DEPTH OF BOTTOM OF FEATURE

Less than .8 ft.—upper left unnumbered hole

1.2-1.6—lower left corner, left unnumbered hole

1.6-2.0—lower left corner, right unnumbered hole

2.0-2.4—lower right corner, lower unnumbered hole

2.4+—lower right corner, upper unnumbered hole

Vertical and Horizontal Distributions

The vertical distribution of artifacts was virtually negligible. Only a very small percentage of the materials came from contexts below the plough zone and outside of habitation features. Therefore no vertical separation of artifacts was possible outside of the latter. Since rates of fill, length of use, kind of fill, and other factors affect individual features in different ways, there was little to be gained from comparing the contents of one level of a feature with the contents of the same level in another feature.

This lack of vertical distribution meant that any variation of artifactual content through time had to be observed in the horizontal distribution by way of seriation and artifact association.

The first step was to find the horizontal distribution of the various artifact classes. The series of maps (Figs. 15-39) shows the presence or absence of particular artifacts and all of the pottery classes in the features. Blackened features indicate presence while blank outlines indicate absence.

Low frequency artifact classes could not be said to have specific distribution qualities, particularly when no systematic as-

sociations with the other kinds of artifacts, features, or organic materials could be shown. It was true, however, that with the small numbers of these classes frequently only one part of the site contained all the examples of a given class.

Of the forty-four artifact classes, exclusive of pottery, sixteen were represented by only a single example, and seven had fewer than five items. Only twenty-one classes had six or more. Of these, triangular unnotched projectile points, drills, scrapers, cores, blanks, primary and secondary decortication flakes, secondary chippage, manos and metates, awls, beamers, and antler projectile points were included in the distribution maps. In addition, the distributions of mussel shells, fish bone, deer bone, turkey bone, and maize were plotted.

The same kind of gross distribution was plotted for the pottery varieties and types as well as for the shell-tempered material.

The most significant conclusion to be reached by this kind of distribution analysis was that all parts of the site were represented throughout. The site was artifactually homogeneous, at least in terms of the presence or absence of the various types, varieties, and classes.

Brown and Freeman noted that variation in samples is caused by a single one, or any combination, of the following three things: 1) functional differences; 2) temporal differences; 3) sampling error.[1] In this instance, the last can be eliminated since each feature was completely excavated. The two remaining causes of variation will be dealt with here.

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[1] Brown, James A., and L. G. Freeman, Jr., "A UNIVAC Analysis of Sherd Frequencies from the Carter Ranch Pueblo, Eastern Arizona," in *American Antiquity*, XXX, No. 2, pt. 1 (1964), p. 162.

FIG. 15. DISTRIBUTION OF ANTLER PROJECTILE POINTS

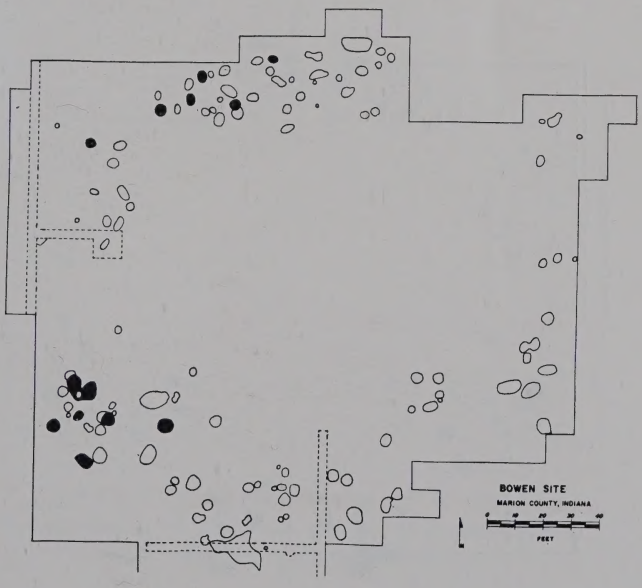

FIG. 16. DISTRIBUTION OF BONE AWLS

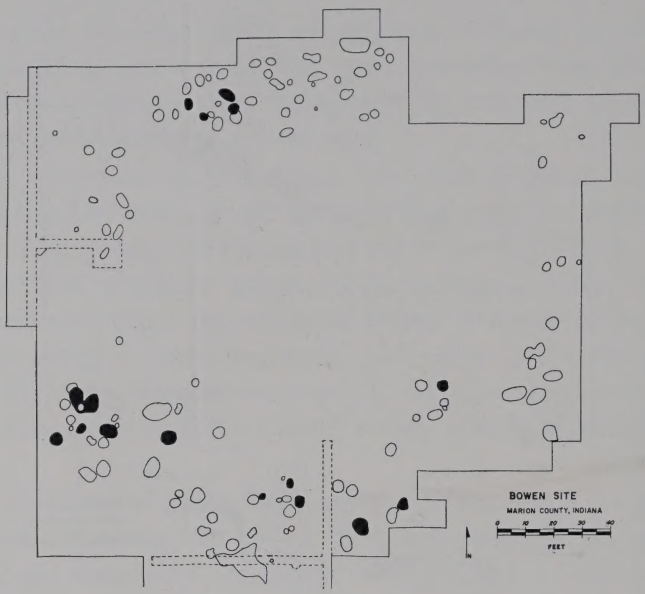

FIG. 17. DISTRIBUTION OF BONE BEAMERS

FIG. 18. DISTRIBUTION OF TRIANGULAR UNNOTCHED PROJECTILE POINTS

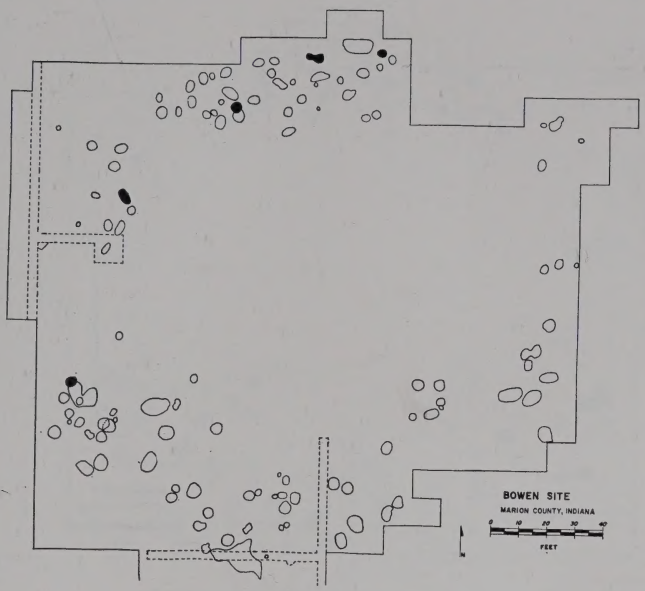

FIG. 19. DISTRIBUTION OF DRILLS

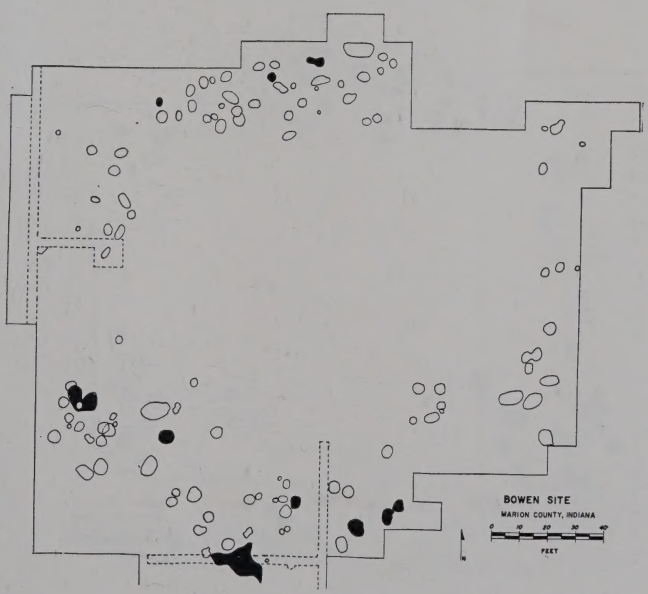

FIG. 20. DISTRIBUTION OF SCRAPERS

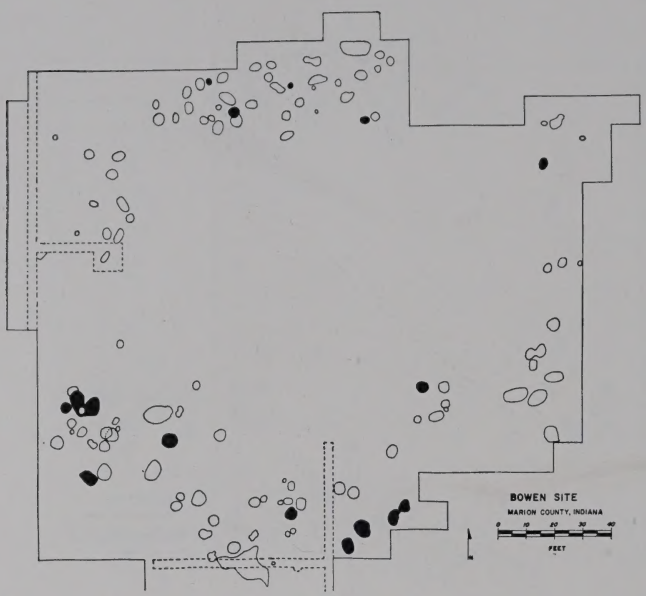

FIG. 21. DISTRIBUTION OF BLANKS

FIG. 22. DISTRIBUTION OF FLINT CHIPS

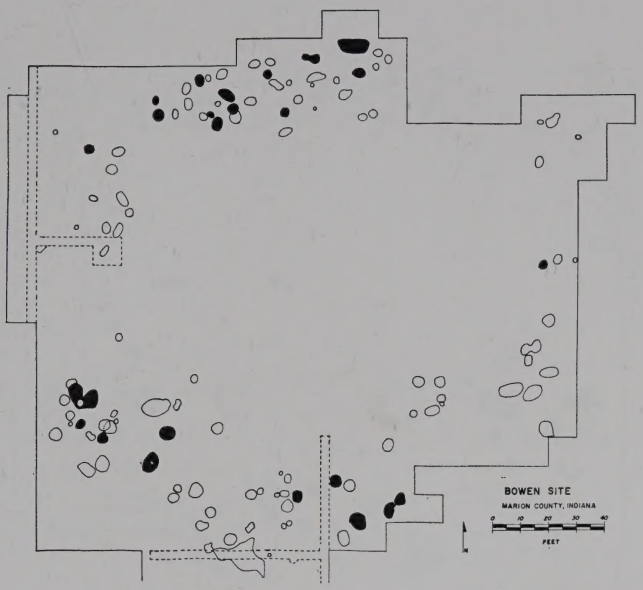

FIG. 23. DISTRIBUTION OF CORES

FIG. 24. DISTRIBUTION OF MANOS AND METATES

FIG. 25. DISTRIBUTION OF DEER BONES

FIG. 26. DISTRIBUTION OF TURKEY BONES

FIG. 27. DISTRIBUTION OF MUSSEL SHELLS

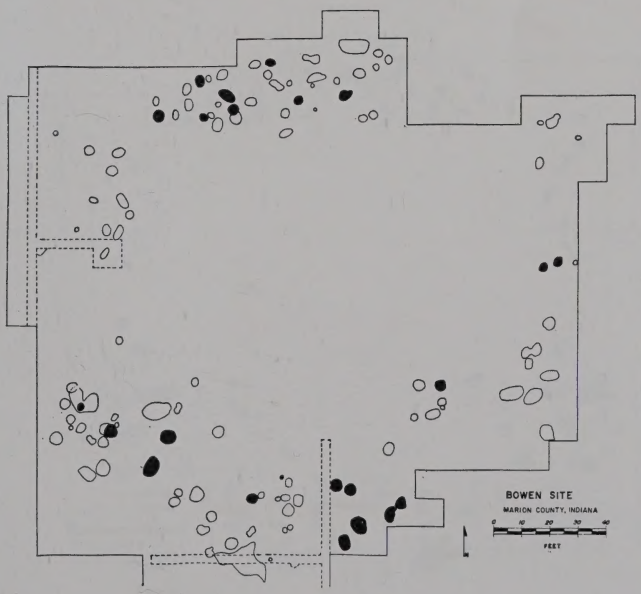

FIG. 28. DISTRIBUTION OF FISH BONES

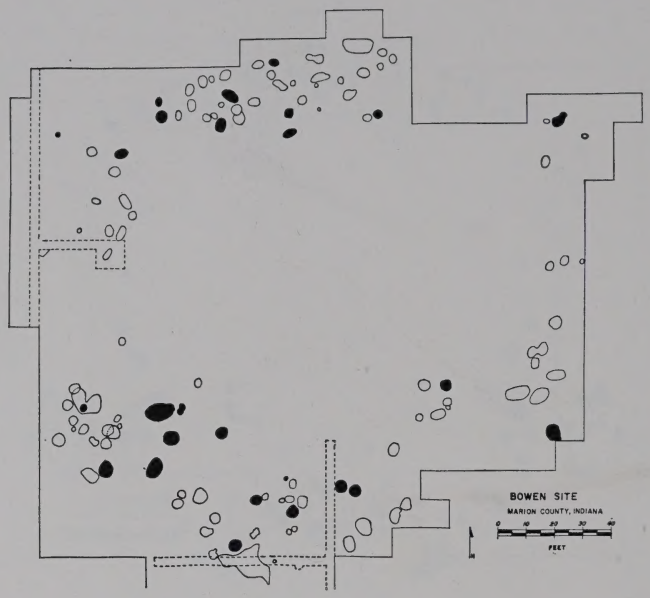

FIG. 29. DISTRIBUTION OF MAIZE

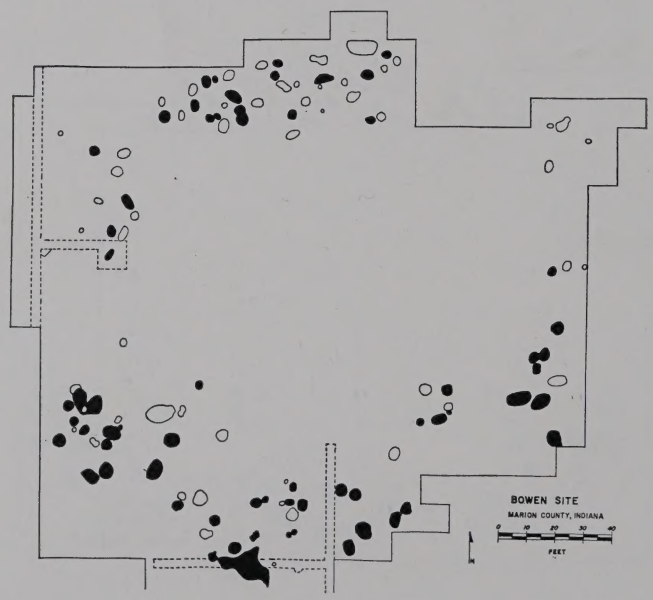

FIG. 30. DISTRIBUTION OF OLIVER CORD-MARKED: INCISED VARIETY (1a)

FIG. 31. DISTRIBUTION OF OLIVER CORD-MARKED: PLAIN VARIETY (1b)

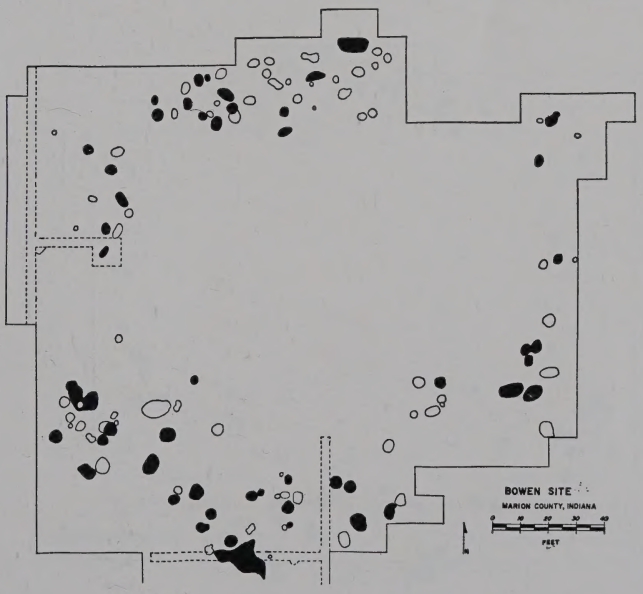

FIG. 32. DITSRIBUTION OF BOWEN CORD-MARKED: CORD-IMPRESSED VARIETY (2a)

FIG. 33. DISTRIBUTION OF BOWEN CORD-MARKED: PUNCHED VARIETY (2b)

FIG. 34. DISTRIBUTION OF BOWEN CORD-MARKED: PLAIN VARIETY (2c)

FIG. 35. DISTRIBUTION OF BOWEN EVERTED RIM TYPE (3)

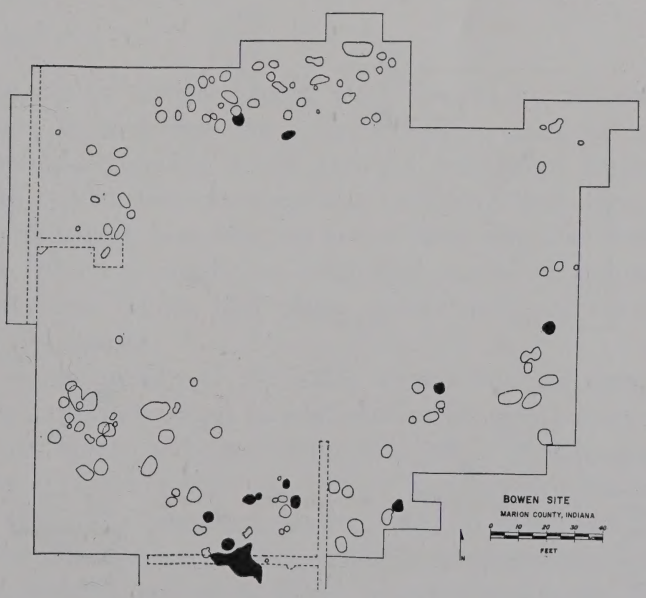

FIG. 36. DISTRIBUTION OF BOWEN FABRIC-MARKED TYPE (4)

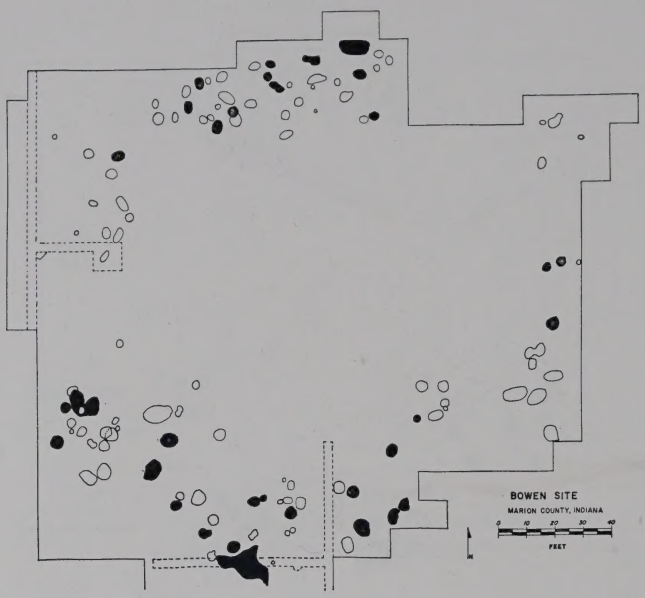

FIG. 37. DISTRIBUTION OF BOWEN COLLARED: CAMBERED RIM VARIETY (5a)

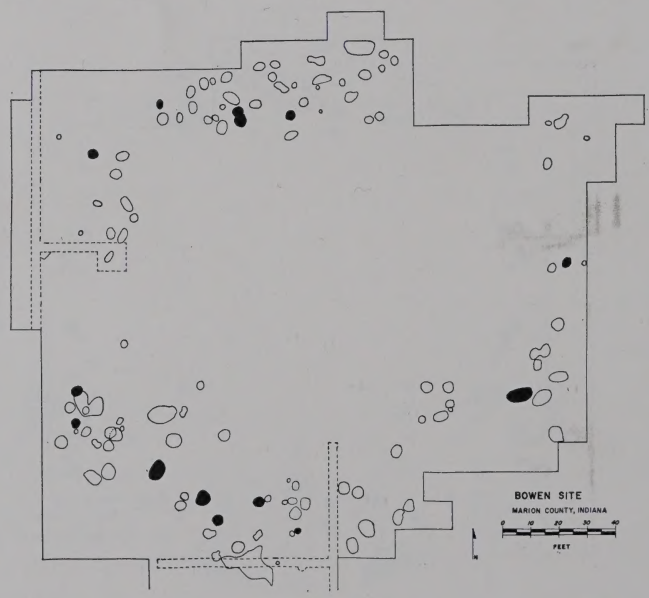

FIG. 38. DISTRIBUTION OF BOWEN COLLARED: STRAIGHT RIM VARIETY (5b)

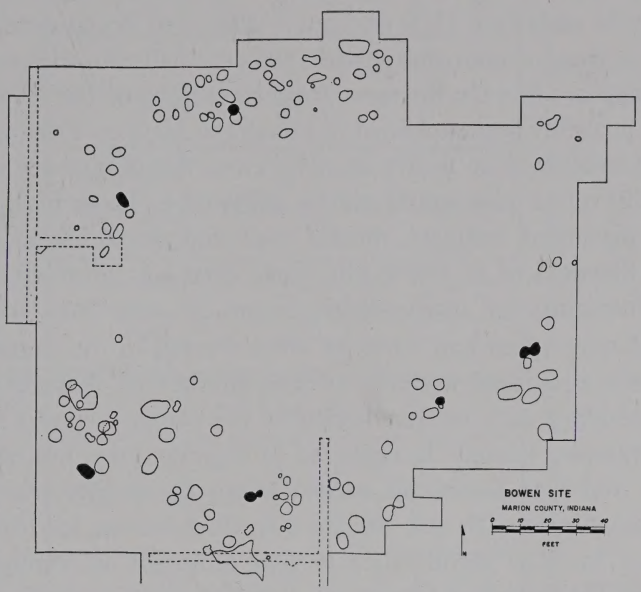

FIG. 39. DISTRIBUTION OF SHELL-TEMPERED POTTERY

Associations

A number of artifact classes were selected for associational examination. In each case the primary artifact class was plotted against several secondary classes and the number of features in which each combination occurred was recorded. Thus there were sixteen features with bone beamers and of them nine also contained bone awls. Beamers, manos or compound manos, triangular unnotched projectile points, flint chips, mussel shell, and corn were treated in this manner.

The salient feature of the Table 19 associational data is its remarkable uniformity. That is, relationships between pottery varieties, artifact types, and less distinctive debris remain constant throughout. Proportionately, the pottery varieties are similar for all of the various associational classes. Table 20 shows the data of Table 19 in percentage form. For example, bone beamers occurred in sixteen features and were found in association with Pottery

variety 1a each time (100 per cent). Standard deviation calculations show a similar uniformity with rather small variations indicated. Corn appears to vary the most from the means of the several classes and is probably best explained in functional manner. Corn is normally totally consumed or nearly so. Therefore the occurrence of corn in basically refuse pits would not be expected to be as high as animal bone, discarded artifacts, mussel shell and chips. These were normally disposed of in refuse pits while corn was normally eaten and only incidently or inadvertently found its way into such pits.

Pottery types and varieties were treated in the same way, but with the additional notation of the number of features in which the secondary class occurred without the primary class (Table 21). For example, Variety 1a occurred in sixty features but not in sixty others and was associated with Variety 1b in fifty-four features; however, Variety 1b also occurred in thirty-seven features without Variety 1a. The significance is that although 1a rarely occurred without 1b, the latter frequently occurred without the former, providing evidence that the two were related varieties of a single type. Further, it suggested that the Variety 1b was the more basic of the two, since it was more independent of 1a than vice versa.

The point was made previously that not all features were equal in terms of artifact content. This was not unexpected, certainly; however, it led to some potential misinterpretation of data since features with large quantities of materials produced most artifactual associations and naturally those with fewer items produced fewer associations. It was not until cross checking the features with few artifacts with the total range of the much more productive features that it became certain that all were the result of the same culture and time.

An example of this potentially confusing distributive problem was presented in the data concerned with the mussel shells. The left column of Table 22 shows the number of features which contained mussel shell as well as the particular artifact. The right column shows the number of features with the same artifact but without any mussel shell.

TABLE 19. *Association of Artifact Classes*

Artifact Class	Occurs in	Occurrences of Association With: Pottery Varieties: 1a	1b	2a	2b	2c	3	4	5a	5b	Shell tempered	Other Artifacts and Materials: Bone Beamer	Bone Awl	Antler Projectile Point	Triangle Projectile Point	Mano	Corn	Mussel Shell
Bone Beamer	16 Features	16	15	14	7	15	9	5	8	1	2	16	9	2	8	7	3	16
Triangular Projectile Point	24 Features	18	24	19	8	16	11	4	12	5	2	8	12	5	24	7	6	19
Mano	20 Features	14	16	9	6	16	6	3	9	2	1	8	8	0	7	20	6	15
Corn	25 Features	13	21	13	8	12	8	4	10	4	1	3	6	0	6	6	25	18
Mussel shell	59 Features	41	53	38	14	40	31	10	25	4	4	16	21	8	19	14	18	59
Flint Chippage (All classes)	17 Features contained all classes	15	16	14	6	13	11	1	11	3	1	7	11	4	9	6	6	16

Shows the number of features containing a specific artifact and then indicates the number of those features which also contained the other artifact classes.

TABLE 20. *Association of Artifact Classes in Percentages*

	Pottery Varieties										Other Artifacts and Materials						
	1a	1b	2a	2b	2c	3	4	5a	5b	Shell Tempered	Bone Beamer	Bone Awls	Antler Projectile Points	Triangular Projectile Points	Mano	Corn	Mussel Shells
Bone Beamer	100	94	88	44	94	56	31	50	6	13		56	13	50	44	19	100
Triangular Points	75	100	79	33	67	46	17	50	21	8	33	50	21		29	25	79
Mano	70	80	45	30	80	30	15	45	10	5	40	40	0	35		30	75
Corn	52	84	52	32	48	32	16	40	16	4	12	24	0	24	24		72
Mussel Shell	69	90	64	24	68	53	17	42	7	7	27	36	14	32	24	31	
Flint Chippage	88	94	82	35	76	65	6	65	18	6	41	65	24	53	35	35	94

TABLE 21. *Association of Pottery Varieties*

Primary Class	Secondary Class: 1a	1b	2a	2b	2c	3	4	5a	5b	Shell Tempered
1a [60]		54(37)	37(14)	14(4)	44(18)	22(7)	11(1)	23(9)	10(5)	6(1)
1b [91]	54(6)		46(5)	17(1)	54(8)	25(4)	11(1)	31(1)	14(1)	5(2)
2a [51]	37(23)	46(45)		15(3)	36(26)	22(7)	9(3)	20(1)	12(3)	6(1)
2b [18]	14(46)	17(74)	15(36)		17(45)	11(18)	5(7)	10(22)	3(12)	2(5)
2c [62]	43(17)	54(37)	35(16)	17(1)		24(5)	11(1)	24(8)	10(5)	4(3)
3 [29]	22(38)	25(66)	22(29)	11(7)	24(38)		5(7)	12(20)	6(9)	4(3)
4 [12]	11(49)	11(80)	9(42)	6(12)	11(51)	5(24)		6(26)	3(12)	2(5)
5a [32]	23(37)	31(60)	20(31)	10(8)	24(38)	12(17)	6(6)		4(11)	3(4)
5b [15]	10(50)	14(77)	12(39)	3(15)	10(52)	6(23)	3(9)	4(28)		2(5)
Shell Tempered [7]	6(54)	5(86)	6(45)	2(16)	4(58)	4(25)	2(10)	3(29)	2(13)	

Each pottery variety is treated as a primary class and its number of associations with other varieties in habitation features noted. Occurrences of the secondary class without the primary class are noted in parentheses. The number in brackets immediately following the primary class numbers indicates how many habitation features contained that particular variety. There were 120 habitation features.

Note the total lack of bone artifacts in features which did not also contain mussel shell, and the overwhelming percentage of each artifact class found in features with shell. The list shows that more than half of the 120 features contained no shell, no bone artifacts, no projectile points other than the triangular unnotched type, no scrapers, and no nuts. Since those artifacts, along with some additional items, were basic to the picture of the culture of the people who lived at the site, it was obvious that features lacking any of those elements might be misinterpreted. However, when combined with pottery and examined for the individual relationships between artifacts it became apparent that the features were all the result of the same culture group and that artifact variation in them was probably due to the function of the feature. Most of those features containing mussel shell were refuse pits containing a wide variety and large amounts of debris, while nearly half of those features which did not have shell contained human burials or were shallow, heavily burned fire basins. The remainder were probably simply disturbed areas which had no definite function or were never fully utilized as they were intended.

The lack of bone artifacts in features without mussel shells also points to the bone-preserving qualities of the calcium carbonate of the shell.

Pottery Seriation

Using the data from the computer print-out, the seriation of pottery varieties was undertaken in order to determine if there was evidence of changing popularities among the contents of features. Since sample bias was essentially eliminated, temporal and functional elements would have been the causes of variation. On the basis of the grouping of features, seven seriational units were established. The seven units consisted of features at the northwest, north, northeast, east, southeast, south, and southwest points around the circular village plan. It was felt that there was some slight physical separation of these groups, although admittedly such separation, particularly in the southern area, was not very distinct.

TABLE 22. *Association of Various Artifact Classes with Mussel Shell*

Features with shell -59		Features without shell -61	
Beamer	16	Beamer	0
Awl	21	Awl	0
Other bone artifacts	17	Other bone artifacts	0
Antler artifacts	8	Antler artifacts	2
Triangular unnotched projectile point	19	Triangular unnotched projectile point	5
Other projectile point	10	Other projectile point	0
Drill	2	Drill	1
Scraper	8	Scraper	0
Chippage	48	Chippage	18
Blank	9	Blank	1
Mano	14	Mano	5
Metate	2	Metate	3
Corn	18	Corn	7
Nuts	8	Nuts	0
Deer bone	48	Deer bone	18
Other animal bone	40	Other animal bone	10
Pottery varieties		Pottery varieties	
1a	41	1a	19
1b	53	1b	38
2a	38	2a	13
2b	14	2b	4
2c	40	2c	22
3	31	3	8
4	10	4	2
5a	25	5a	7
5b	4	5b	3
Shell tempered	4	Shell tempered	3

Table 23 shows the groups as numbered and the features included.

TABLE 23. *Pottery Seriation Groups*

Group One:	Northwest Features 8, 21-27, 55-58
Group Two:	North Features 59-87, 93-100
Group Three:	Northeast Features 101-104
Group Four:	East Features 105-111, 117, 119, 120
Group Five:	Southeast Features 53, 92, 112-116, 118
Group Six:	South Features 1-7, 9-20, 47, 88-91
Group Seven:	Southwest Features 28, 30-40, 42-46, 48-52, 54

It quickly became apparent that Group Three would not provide a valid conclusion since only sixteen sherds were available from its features. Thus only six groups figured in the seriation study. Within each group the percentage for each variety was calculated

and plotted on a bar graph. The graph was then inspected to see if there were any co or inverse variations between varieties. A number of anomalies were presented.

First, in Group 5, 68 per cent of the sherds were Type 1 (Oliver Cord-marked), basically Fort Ancient pottery. In addition the greatest percentage of shell-tempered sherds also occurred in Group 5, while the remaining varieties were at or very near their lowest proportions. This suggested that Type 1 varieties and shell tempering varied together, but inversely to the remainder of the varieties.

The second major anomaly was seen in Group 4 in which Type 1 had its lowest percentage level on the site. The Type 1 varieties constituted 44 per cent of the pottery from Group 4 features while the Plain variety (2c) of Type 2 (Bowen Cord-marked), and especially Type 3 (Bowen Sharply Everted Rim) were at, by far, their highest levels: 30 per cent and 13 per cent, respectively.

Extreme caution must be exercised in the temporal interpretation of this seriational study. The Fort Ancient-like Type 1 pottery seemed to be more popular in Group 5 at the expense of Variety 2c and Type 3. But this assumed the temporal trend to be from the more Woodland-like 2c to Type 1, not necessarily a sound assumption. This was especially true in light of Type 3. This last was the sharply everted-rim material, characteristic of Upper Mississippian materials of northern Illinois, particularly Langford. This was the northeastern Illinois version of Woodland–Mississippian acculturation and thus roughly equivalent to Fort Ancient. The interpretation for the Bowen Site would have had to read: Woodland influenced by Langford and Fort Ancient, and slightly later Fort Ancient further submerging the Woodland–Langford elements.

While the above may well have been true, it seems more likely, at present, that the variations between groups of features were primarily due to functional rather than temporal differences. However, the nature of said functional differences was not immediately apparent in the distribution analysis.

TABLE 24. *Percentage Distribution of the Totality of Each Pottery Variety Among the Seven Seriational Units*

	1	2	3	4	5	6	7	Total
1a	4.25	16.66	0	5.31	16.31	37.58	19.85	99.96
1b	5.07	24.23	1.14	6.34	16.49	33.37	13.32	99.96
2a	7.91	23.75	1.66	4.58	7.50	38.75	15.83	99.94
2b	1.69	18.64	0	1.69	1.69	38.98	37.28	99.91
2c	3.51	22.01	0.23	10.30	9.13	37.70	17.09	99.97
3	2.43	32.92	0	23.17	13.41	17.07	10.97	99.97
4	0	7.69	0	3.84	7.69	80.76	0	99.98
5a	0.92	24.07	0	3.70	5.55	42.59	23.14	99.97
5b	2.00	12.00	4.00	4.00	0	66.00	12.00	100.00
Shell	5.26	5.26	0	5.26	47.36	10.52	26.31	99.97

Table 24 shows the heaviest concentration of materials to be in Group 6. Including the nine varieties as well as a shell-tempered category, Group 6 contained a plurality in eight of the ten classes. The small numbers of Type 4 and the shell-tempered class precluded distributional analysis. Of the remaining eight classes only one, Type 3, had its plurality in another group of features. Significantly, Type 3 did not seem to be particularly associated with any other class of artifacts. This suggests that Type 3 was a clearly independent cultural element which was not tied to anything else. There was thus good separation of the Illinois-oriented Type 3 pottery and the Ohio oriented Type 1 pottery. Mixing was present to a degree, but the entities remained basically separate.

Table 25 shows two things: first the number of sherds of each variety in each group of features and, second, the percentage within each group. The shell-tempered materials were figured as a separate category since all of those sherds were included in the types and varieties.

The attempt to order temporally the constellations of habitation features on the basis of pottery seriation was not successful. The reason was that there was very little variation from feature group to feature group in the proportions of each of the varieties. In general nearly every group of features had examples of every type of pottery. Only Type 4 and Type 5b varieties were not found in every group. Both of these were very small classes with spotty

TABLE 25. *Pottery Variety Percentages by Group*

	1a	1b	2a	2b	2c	3	4	5a	5b	Shell
Group 1	13 14%	39 43%	18 20%	1 1%	15 17%	2 2%	0 0	1 1%	1 1%	1 1%
Group 2	47 10%	191 43%	54 12%	11 3%	90 20%	21 4%	2 .4%	26 5%	7 2%	1 .2%
Group 3	0 0	9 56%	4 25%	0 0	1 6%	0 0	0 0	2 13%	0 0	0 0
Group 4	15 10%	50 34%	11 7%	1 .6%	45 30%	19 13%	1 .6%	4 3%	2 1%	1 .6%
Group 5	46 18%	130 50%	18 7%	1 .4%	39 15%	20 8%	2 .8%	6 2%	0 0	9 3%
Group 6	106 14%	264 35%	93 12%	23 3%	162 21%	14 1%	21 3%	46 6%	33 4%	2 .2%
Group 7	60 16%	152 39%	38 10%	22 6%	73 19%	9 2%	0 0	25 6%	6 2%	5 1%

but generally widespread distributions. Tables 24 and 25 summarize the data for each of the groups of features while Figure 40 represents them graphically.

It appears that the time span involved in the Bowen Site was not sufficiently long to allow for much change in the popularities of the various kinds of pottery or in the decorative styles.

Sampling

A unique opportunity for testing archaeological field sampling techniques was afforded by the fact that the Bowen Site had, essentially, been excavated in its entirety. Probably no site can be said to have been totally excavated, due to the exigencies of techniques and the impossibility of ever knowing that all of a site was within a given area. However, even given these limitations, it seemed plausible to treat the Bowen Site *as if* it had been completely excavated.

Archaeological sites are unique; no two are ever exactly alike. Particularly in salvage operations, when total destruction is imminent, it becomes essential that either the site be totally salvaged or a truly representative sample of its remains be obtained. In non-salvage situations additional sampling may be possible although

Fig. 40. Bowen Site Pottery Seriation

it is usually not feasible. Therefore, sampling, for most sites, is a one-shot proposition. It is, of course, imperative that the sample be representative the first time around.

In reality, every site is only sampled. However, when we use those samples to construct areal and regional chronologies, culture histories, and even higher-level syntheses, we are wrong in thinking that the sampling error is canceled out. For example, as Brown and Freeman point out, the changing popularity of a pottery type between sites or in a site, may reflect a sampling bias based in functional areas excavated rather than temporal differences.[2] The only way to be sure would be to have control of such sampling problems.

What follows is the result of some sampling procedures presently in use in archaeology today, along with some observations as to how each would have altered the impressions gained about the Bowen Site, had it been sampled instead of totally excavated.

A great deal has been written in recent years about various sampling techniques and their applications in archaeological method.[3] The problem in sampling is to infer something about a universe (in this case an archaeological site and the culture of its no longer extant people) using only a portion of that universe. The difficulty is obtaining a truly representative portion. In archaeology

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[2] Brown and Freeman, "A UNIVAC Analysis of Sherd Frequencies from the Carter Ranch Pueblo, Eastern Arizona," in *American Antiquity*, XXX, No. 2, pt. 1, p. 162.

[3] Treganza, A. E., and S. F. Cook, "The Quantitative Investigation of Aboriginal Sites: Complete Excavation with Physical and Archaeological Analysis of a Single Mound," in *American Antiquity,* XIII, No. 4 (1948), pp. 287-97; Vescelius, Gary S., "Archaeological Sampling: A Problem of Statistical Inference," in *Essays in the Science of Culture in Honor of Leslie A. White,* edited by G. Dole and R. Carneiro (Thomas Y. Crowell, New York, 1960), pp. 457-68; Heizer, Robert F., and S. F. Cook, "Some Aspects of the Quantitative Approach in Archaeology," in *Southwestern Journal of Anthropology,* XII (1956), pp. 229-48; Heizer, Robert F., and S. F. Cook (eds.), *The Application of Quantitative Methods in Archaeology* (*Viking Fund Publications in Anthropology,* No. 28, Chicago, 1960); and Rootenberg, S., "Archaeological Field Sampling," in *American Antiquity,* XXX, No. 2, pt. 1 (1964), pp. 181-88.

there are basically two points at which sampling procedures may be utilized. The first is during excavation and the second is during analysis. The two might seem to be part of the same thing, except that in the second case one samples a known universe and in the first the extent of the universe may not be known.

The following discussion is concerned primarily with sampling at the excavation stage and should not be interpreted as an attack on the techniques currently in use so much as a plea for caution concerning what is done with the results of sampled excavations.

RANDOM SAMPLING

Random sampling has been suggested as a means of recovering an unbiased sample, particularly if one is careful to sample each of the natural units of a site. That is, samples should be collected from mounds, other structures which show on the surface, as well as recognizable midden areas. Each such unit should be randomly sampled in order to achieve some approximation of equal representation.

In the case of a small habitation area such as the Bowen Site, which has no discernible natural units other than the whole site, such a procedure as random sampling would consist of dividing the site into excavation units of arbitrary size and randomly selecting a set of units to be excavated. The number of such units chosen would normally depend upon the amount of time, the number of laborers, and other such practical considerations. Such a procedure is, however, for the most part, a waste of time. The problem is, that in order for a random sampling technique to be applicable, the universe being sampled must be of a known structure. An archaeological site is not a known universe. Human beings are not random in their activities, but rather are selective about what they will do in which part of their living area. And it is the desire to learn precisely this kind of information that anthropologically orientated archaeologists dig. As an example of how such a sampling technique can lead one astray, consider the following "after the fact"

view of the Bowen Site, had it been randomly excavated.

Taking the present outline of excavated area and using the 330, 10 by 10-foot squares as the basis, a sample was calculated in the following manner. At the Bowen Site the first year there were four workers and roughly seventy working days or three months to complete the operation. Each worker could average about one cubic yard of dirt moved each day. Each 10-foot square contained 100 square feet and, on the basis of a test excavation, was about two feet deep. Thus, each square contained 200 cubic feet of dirt and debris to be moved at the rate of one cubic yard or twenty-seven cubic feet of dirt per day, per worker. Allowing ten days for unpredictable events such as rain, as well as for staking, surveying, and other necessary procedures, there were 60 days x 4 laborers x 27 cubic feet of dirt per day. This figures to 6,480 cubic feet of dirt which one could reasonably expect to move during the three-month period. Since there are 200 cubic feet to be excavated to each square, this is reduced to 32.4 squares. Rounded off to thirty-three this is precisely 10 per cent of the total squares in the site.

A random sample of 10 per cent of the site was then drawn. Each number drawn designated a block of the present grid system even though the latter was admittedly irregular in its numbering. Such irregular numbering was not in any way relevant or disturbing to the random sampling procedure. The individual location of a numbered block was irrelevant since at this point the concern was simply with a consecutive series of numbers which was being sampled.

The sample blocks were located and the information provided by them assembled in Tables 26 and 27. It was assumed that the samples would provide about 10 per cent of each class of nonceramic items. A question mark in the "expected" column means the total number of items for that class was too small to project meaningful expectation.

The randomly drawn sample shows that had it been the basis for excavation, sixteen low frequency items would not have been encountered at all and five items which were numerous enough to

expect them to have been statistically represented would not have been encountered either. Nearly 10 per cent of the corn kernels appeared in this sample, as did slightly over 10 per cent of the cornstalk and hickory nut fragments. However, neither corncobs nor walnut fragments were in evidence. All of the pottery types were found in the sample blocks but the sampling suggested somewhat deceptive distributions. Varieties of three of the five types, as well as the shell-tempered material would have been skewed from their true distributions.

Perhaps the most deceptive result of the random sample would have been the total lack of evidence showing the circular nature of the site. Only features located in the southern third of the site would have been encountered had the sample first drawn been the one which actually controlled excavation at the site.

TABLE 26. *Artifact Samples*

Artifact or Item	*Random Sample*	*Cluster Sample*	*Number expected at 10% of total for class*
Bone:			
Beamers	6	0	3
Awls	11	5	4
Hook	0	0	?
Pin	1	1	?
Pendant	0	0	?
Cut Beaver Incisor	0	0	?
Worked os penis of raccoon	0	0	?
Cut bird leg bone	1	1	?
Polished bone	0	0	?
Spatula	0	0	?
Ear spool or ring	0	0	?
Antler:			
Cut tine	1	0	1
Chipped Stone:			
Projectile points	17	14	14
Blanks	5	1	3
Drills	0	3	2
Scrapers	3	1	3
Chips	225	279	220
"Checked" pebbles	0	0	11
Spokeshave	0	1	?
Ground Stone:			
Manos	1	1	2
Manos and anvil	0	0	2
Mano and hammerstone	0	0	?
Mano, anvil and hammerstone	4	0	1
Metate	0	1	1

TABLE 26. *Artifact Samples*—continued

Artifact or Item	*Random Sample*	*Cluster Sample*	*Number expected at 10% of total for class*
Anvils	2	1	2
Hammerstones	2	1	1
Celt	2	0	1
Abrader	0	1	1
Sandstone pallette	0	0	?
Pipe stem	0	0	?
Gorget	0	0	?
Bannerstone	0	0	?
Worked hematite	2	0	?
Heat-cracked rock fragments	14	1	5
Burned limestone fragments	3	3	3
Shell:			
Cut shell	0	3	?
Miscellaneous:			
Corn kernels	47	11	65
Cornstalk fragments	2	0	1
Corncob fragments	0	0	5
Hickory nut fragments	3	1	2
Walnut fragments	0	1	?
Unidentified botanical specimens	3	0	1
Fresh-water mussel shells	1,207	1,069	456
Aquatic snails	126	1	19
Terrestrial snails	41	44	51
Amorphous shell-tempered fired-clay object	0	1	?
Burned clay	0	0	?
Unworked copper fragments	0	0	?
Mud daubers nest	0	1	?
Other stone, unworked	73	24	29
Features	10	7	11
Human burials	1	2	4
Dog burials	1	0	1

TABLE 27. *Pottery Samples*

Random Sample

Type 1. Oliver Cord-marked:
- a. Incised variety—continuous distribution around site as expected
- b. Plain variety—continuous distribution around site as expected

Type 2. Bowen Cord-marked:
- a. Impressed variety—continuous distribution around site as expected
- b. Punched variety—only in one square in extreme south vs. expected continuous distribution around site
- c. Plain variety—continuous distribution around site as expected

Type 3. Bowen Everted Rim—south and west sides and only one square on north and east sides vs. continuous distribution expected

Type 4. Bowen Fabric-marked—continuous distribution as expected

Type 5. Bowen Collared:
- a. Cambered Rim variety—limited to south and west sides vs. expected continuous distribution around site
- b. Straight Rim variety—limited to south and west sides vs. expected continuous distribution around site

Shell-tempered—limited to the southwest half of the site vs. expected continuous distribution around site

Stratified Cluster Sample

Type 1. Oliver Cord-marked:
- a. Incised variety—continuous distribution around the site
- b. Plain variety—continuous distribution but very light in southeast

Type 2. Bowen Cord-marked:
- a. Impressed variety—general distribution in the north half of the circle, but only in two squares in the south half
- b. Punched variety—two squares in north stratum and two in south, suggesting continuous but very light distribution
- c. Plain variety—four blocks in north stratum and three in south; continuous and only slightly heavier distribution than for punched variety

Type 3. Bowen Everted Rim—two blocks at the south edge of the north stratum and two at the south edge of the south stratum; thin distribution

Type 4. Bowen Fabric-marked—continuous distribution around the site

Type 5. Bowen Collared:
- a. Cambered Rim variety—continuous distribution around the site
- b. Straight Rim variety—in only two blocks on the west edge, one in each stratum

Shell-tempered—very little found and only in the southwestern one third of the site

On the basis of the evidence obtained by random sampling a number of conclusions might have been drawn which are in fact erroneous in the light of total excavation. As mentioned, the circular nature of the site would have been missed. Inferences as to the meaning of the distribution of pottery types, particularly the collared types, might have given some special function to the area in which they were found. Possibly temporal or other interpretations might have been offered for shell-tempered material found only in the southwestern half of the site.

CLUSTER SAMPLING

Perhaps the most lucid and readily applied field sampling

program in use today is that described by Rootenberg.[4] It is essentially a sampling technique which incorporates the realization that archaeological sites are not random. Seeking to avoid as much of the "nonrandomness" of a site as possible and still excavate a meaningful sample, Rootenberg proposed the following sampling procedure which he called stratified cluster sampling.

A site is divided into two or more primary areas called strata. Each stratum or culture cluster is then divided into cultural units, such as mounds, graves, house structures, and other visible remains; or artificial units, such as squares in a grid system. Instead of excavating clusters randomly within each of the strata, the idea is to excavate samples from each class of clusters in each stratum, thus insuring greater spatial coverage and lessening any tendency to dig only more productive areas or only more obvious things such as mounds. In a site like the Bowen Site, which has no clearly divisible cultural clusters or natural strata, the whole process is once again artificial.

Calculation is made of the amount of dirt included in each cluster, the amount of dirt the crew can dig during the season, and then the number of clusters which can be excavated. The total number of clusters is divided by the number which can be excavated in order to establish the sampling interval. That is, one out of every so many clusters can be dug during the season. Clusters to be excavated are systematically selected. For example, this can be done by starting in one corner of the grid system of each stratum and digging every fourth or sixth or tenth square according to the sampling interval. It is important, however, to randomize the order in which actual excavation of the selected squares takes place, so that the early chance encounter of a time-consuming element in one area of the site, such as a burial, does not leave too little time to complete the sampling layout.

On the basis of the field notes and indications of discussions as

[4] Rootenberg, "Archaeological Field Sampling," in *American Antiquity*, XXX, No. 2, pt. 1, pp. 181-88.

to the density of surface debris in various parts of the Bowen Site, it will be assumed that the original workers would have chosen a northern and a southern stratum, dividing the site in half. In this test, there were thus two strata, each consisting of approximately 165 squares or clusters, ten feet on a side. In the previous sampling test the amount of dirt to be moved and the number of ten-foot squares which the four-man crew could dig was established as 6,480 cubic feet and thirty-three squares. 330/33 yields a sampling interval of one out of every ten squares. Thus, sixteen or seventeen squares would have been dug in each strata. In the north the counting began with Block 137 and proceeded to the row below, each time starting the new row at the end closest to the last square in the finished row. Thus, after 138 came 139, after 125 came 113, after 165 came 164, and after 149 came 150. In the southern stratum counting off began with Block 66 and proceeded in the same manner working north. Thus, after 61 came 55, after 60 came 130, and after 67 came 68. The actual block numbering here is obviously irrelevant to the sampling interval which is one out of every ten blocks regardless of block numbers. The results of the Rootenberg sampling technique were even more skewed than those of the random sample, as Tables 26 and 27 show.

Twenty-two artifact classes, three botanical classes, and three other classes of materials known to be at the site would have been missed in the stratified cluster sample. Of the missing artifact classes fifteen were low frequency and seven, at least statistically, should have occurred in the sample. Most surprising of all was the complete absence of beamers in the sample although they constituted one of the highest frequency classes. The extremely low number of ground-stone artifacts in the sample relative to the actual number at the site would be very misleading. In particular, only one plain mano or combination mano and one metate were in the sample. This, coupled with the small number of corn kernels and the lack of other parts of the plant, would suggest that corn horticulture was just beginning to get started or that it was of only slight importance in the total subsistence pattern.

The most deceptive things about the pottery distributions were the rather northward appearance of the Bowen Cord-marked type, and the southwestern cast of the Bowen Collared type. Both were of general distribution throughout the site but were mutually exclusive in the stratified cluster sample. Shell tempering was even more exclusively southwestern in this sample than in the random sample and seemed to be associated with the collared type, a very difficult association to interpret.

It was probable that at least a tentative conclusion about the circular nature of the site could have been reached on the basis of the distribution of the features. Approximately two thirds of the circle would have been closed by the seven features, which would have been found by the stratified cluster sampling, and this, plus the lack of material from the center, could have justified such a suggestion.

If the sampled Bowen Site had been used to define a phase or focus, then the incomplete picture would have made comparison with other sites a somewhat risky proposition. Elements not in the sample but present at the site might have been found in another site but remain unrecognized as having a counterpart at Bowen. The reverse could have been true if the second site was also sampled.

How does one go about producing a cultural grammar, a material inventory, or a statement of adaptation to a total environment, when such a large range of variation is missing from the data? It can only be done in part and herein lies a major problem. Is the sum of the parts equal to the whole? Do the samples of materials from several similar sites cancel sampling error from any one of the sites?

It is evident that were the two samples tabulated here the basis for an analysis of the Bowen Site, some rather significant differences would have arisen between either of them and the one based on the total excavation. And significant differences would have arisen between the two samples although not perhaps as great. No archaeologist or statistician would be greatly surprised at the results of this sampling trial nor would either be unduly concerned

about such a one-time effort. If a sufficient number of trials were run, there would be a statistical leveling effect which would bring the whole around to an interpretation similar to, if not the same as, that based on total excavation. But an archaeological site is dug only once, and the leveling effect is misleading. Thus it is that as we assemble more and more data about sampled archaeological sites, statistics seem to be on the side of the archaeologist in that errors tend to be reduced in magnitude and eventually eliminated by the sheer weight of numbers. This would indeed be true if all sites were carbon-copy universes. Obviously, they are not. Therefore, since we are sampling different universes and combining parts of each, are we not creating a universe entirely different from any of the constituent ones? It can, of course, be argued that we are sampling the same universe, the culture of man. But if so, we have different adaptations, elements, or artifacts occupying the same loci in that universe, a physical impossibility. It is true, then, that we are sampling different universes, making misinterpretations at least in part based upon sampling error, and molding the whole into some kind of coherent pattern, which in its coherency is a logical construct or an average but not necessarily illustrative of a past reality.

The only certain way to cut the influence of sampling error to a minimum in an archaeological context is to excavate sites completely. As Chard pointed out, in Russia this has become standard operating procedure.[5] Here, at present, it is a practical impossibility, of course, and thus, we are again at the impasse of having to resort to sampling. It is, then, absolutely essential that archaeologists become more aware of sampling error as a dire threat to the validity of their work, and that they proceed, in co-operation with statisticians, to devise increasingly more powerful kinds of techniques. We must constantly be aware of the basis upon which grandiose culture history structures have been and will con-

[5] Chard, Chester S., "Archeology in the Soviet Union," in *Science,* CLXIII, No. 3869 (1969), p. 774.

tinue to be built and be careful always to view them with a critical eye.

Cultural Ecology

The economic productivity of the White River Valley at the time the Bowen Site was occupied could be described as abundant. Heavy stands of oak-hickory forest bordered the valley, affording large quantities of nuts and acorns. The river contained extensive mussel beds as well as numerous and prolific species of fishes. While the valley was not a major flyway, considerable numbers of migratory birds followed the river in their southward flights. Deer, bear, and raccoon, and the turkey head the list of mammals and of permanently resident birds. The rich alluvial bottom lands supported large quantities of plants producing edible seeds and were ideal for the growing of maize. The valley was probably a place where hunger was relatively easily assuaged.

Vegetable foods were not well represented in the recovered materials. Thus, there was no evidence of the utilization of plants with small edible seeds; however, these may have been, and probably were, a significant part of the diet. The recently developed flotation methods for the recovery of minute remains[6] might have clarified this problem considerably. Larger items such as nuts, corn kernels, and cobs were recovered. There were few of the first but a suprising number of the latter two. It seems likely that corn had replaced to a large degree seeds and nuts as a dietary staple. Full dependence upon horticulture has not been demonstrated at the Bowen Site and, in fact, was probably never achieved by its inhabitants.

Further evidence that corn production was not the dominant characteristic of the subsistence pattern was found in the large quantity and variety of faunal remains. Birds, fish, mussels, turtles, and a wide variety of mammals were in use.

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[6] Struever, Stuart, "Flotation Techniques for the Recovery of Small-Scale Archaeological Remains," in *American Antiquity,* XXXIII, No. 3 (1968), pp. 353-62.

Cleland's discussion of focal and diffuse economies emphasized that hunting and gathering versus agriculture is not an entirely satisfactory model of subsistence economies.[7] He suggested that economies which focus upon one or two extremely reliable resources be designated as focal and those which have the "shot gun" approach of using nearly everything that is available, be termed diffuse.

Using Cleland's yardstick, the Bowen Site was occupied by a people having a basically diffuse economy, but one which was probably in a state of change with corn replacing many other vegetable food resources.

While speaking of the diffuse economy, Cleland noted: "The lack of economic specialization has significant implications for evolutionary change—it provides the milieu from which these societies can take advantage of new resources or methods of exploiting old ones by simply shifting the emphasis of subsistence activities. Diffuse adaptations are, to borrow a biological term, pre-adapted societies."[8] It is clear, then, that a diffuse economy, which has a number of exploitive patterns, can become a focal economy relatively easily simply by concentrating upon one particularly favorable pattern. The Bowen Site people may have been in the process of doing just that.

Deer and turkey account for more than 60 per cent of meat animals and 78 per cent of meat poundage. Using the figures in Cleland,[9] the amount of usable meat produced by the remains at the Bowen Site was estimated. Only two thirds of the bone material from the site was identified, suggesting that the final figures would be approximately half again as large as those presented.

There was an approximate total of 50,000 pounds of usable meat provided by the identified bone material. As indicated, this was calculated from only two thirds of the total bone collection. This would mean approximately 75,000 pounds for the entire

[7] Cleland, *The Prehistoric Animal Ecology and Ethnozoology of the Upper Great Lakes Region,* pp. 42-45.

[8] *Ibid.,* p. 44.

[9] *Ibid.,* pp. 135-137.

TABLE 28. *Usable Meat Calculated from Approximately 2/3ds of the Faunal Remains Recovered*

Common Name	*Lbs. usable meat per individual*	*No. Individuals*	*Lbs. Meat*
Deer	100 lbs.	382	38,200 lbs.
Turkey	8.5	83	705.5
Raccoon	17.5	40	700
Squirrel	1.5	60	90
Dog	15	32	480
Woodchuck	5.6	20	112
Elk	350	17	5,950
Beaver	31.5	10	315
Rabbit	2	10	20
Muskrat	2.1	7	14.7
Mallard	1	6	6
Bear	210	6	1,260
Porcupine	10	4	40
Snapping Turtle	20	3	60
Passenger Pigeon	1	3	3
Bobcat	15	4	60
Opossum	5.6	3	16.8
			48,973.01 lbs.

Weight estimated for other species found was not included above either because they were not generally regarded as a meat source or were extremely small in number.

collection, exclusive of fish or mollusks. The meat of these species would produce an average of about 1,000 calories per pound. We can thus project that exclusive of fish, mollusks, and vegetable foods there were roughly 75,000,000 calories available in the meat supply evidenced.

Nearly all nutritional investigations on human beings have involved modern populations in which individuals on the whole are larger than in aboriginal populations, and probably require more food. The higher calorie requirements seem based on ideals which were unattainable aboriginally and thus a much lower figure must be used. Estimates vary considerably as to the caloric intake necessary to maintain good health. The range is from about 1,300 to 2,500 calories per day. Men need more calories than women or children and large people more than small. Cleland utilized an

acceptable figure of 1,500 calories per day for calculating the Juntunen site.[10]

The above amount of meat would have, by itself, provided sufficient succor for 50,000 person/days. That would be food for 50,000 people for one day or one person for 50,000 days.

Since mollusks seem to have played an important subsistence role at the site, and we may assume by their numbers that they were at least part of the reason for settling at that particular location, we should add a factor to the total to include them. However, these figures are all highly speculative and it might be more conservative to let the fish and mollusks provide a margin of error against too large a total. A final factor of the amount of vegetable food should also be included in order to reach a more accurate population estimate. This is not really possible since there is no way of knowing what proportion of the total diet was vegetable. It is certain that corn played an important role in Late Woodland times, but how important is not known.

Perhaps a realistic population figure would be fifty people for a thousand days. Including vegetable food, perhaps fifty people could have lived there for three to five years, if they lived at the site all year round. The presence of forty burials, some of which intruded on earlier interments, suggests a longer period of time, sufficient to have lost track of earlier burial locations.

Clues to the number of people who lived at the Bowen Site are provided by: 1) the size of the occupation area; 2) the number of burials; 3) the length of occupation; and 4) the kind of occupation. It should be emphasized, however, that even by the best of standards the resultant estimates are just that, estimates only!

A circular encampment approximately two hundred feet in diameter could not have had a very large population. The number of burials, forty, suggests that some degree of permanency was involved. A small population would not be likely to produce forty deaths in a short period under normal conditions. Normal conditions

[10] Cleland, *Prehistoric Animal Ecology*, p. 197.

can be postulated since there were no mass burials and the sex and age proportions were not out of line. The intrusion of several burials on others means enough time elapsed for the precise location of earlier interments to have been forgotten.

The occupation was probably of a seasonal variety. This is suggested by the fish, mussels, waterfowl, deer antler, corn, and lack of evidence of permanent housing. The fish and mussels would have been available all year round, but winter weather and icy river water are not boon companions of man. At least the mussels, which appear to have been of great significance in the diet, would not have been readily procured in the winter. Deer antlers suggest fall hunting. The presence of duck, loon, and goose bones indicates early spring or late fall occupation but not necessarily continuous occupation during the summer. It seems likely, therefore, that the site was occupied long enough in the spring to plant corn, possibly during the summer and certainly during the fall. However, relatively few habitation features suggested corn storage pits and only twenty-five out of one hundred and twenty features produced evidence of corn. Therefore, occupation through the winter months seems unlikely.

The proximity of a number of sites which appear to be basically similar suggests that the area in general may have been one which attracted several culturally homogeneous groups. A second possibility might be a single group which moved from place to place, as necessity required, over a substantial period of time. A third and more probable alternative would combine elements of both ideas. Several small groups of culturally similar people probably used the White River Valley on a seasonal basis but did not necessarily return to the same site each year. Although sufficient time must have elapsed to allow for forty burials at one of the sites, it was apparently not sufficient to allow substantial changes in the material culture inventory or artifact styles.

It is probable that the Bowen Site was used intermittently on a seasonal basis by no more than one hundred people during perhaps the period of one generation.

External Relationships and Dating

Immediate Relationships

The external relationships of the Bowen Site can be divided into two kinds, immediate and distant. The immediate relationships consist of several nearby sites from which surface collections and a very limited amount of excavation have produced sufficient materials to provide a valid indication of similarity. The closest of these sites are found along the White River in Marion and Hamilton counties (see Figure 1). They are: Oliver, Bosson, Haueisen, Conner Trading Post, Strawtown, and the Jose Site.[11] Other sites exhibiting the unique Bowen-like ceramics are reported for the area,[12] but to date none of the material from them has been seen by the writer.

Only the Haueisen, Oliver, and Jose sites have had any excavation and that has been very slight. In actuality only a few test pits have been dug in each. Weer's report of the Haueisen excavation is largely inadequate for present purposes except to note that the complex of ceramic materials places it well within the Oliver Phase.[13] Householder excavated on the Oliver and Jose sites in recent years and was able to salvage some materials from the jaws of heavy earth-moving equipment used in building a new bypass around the north side of Indianapolis.

Both the Oliver and Jose sites were too badly chewed up to give any kind of site description, limiting information to artifacts only. The ceramics were given primary consideration and

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[11] For reports on these sites see Householder, "Surface Pottery from Marion County, Indiana," in Indiana Academy of Science, *Proceedings,* 1940 (1941), pp. 36-38, and "The Oliver Farm Site," in *ibid.,* 1944, pp. 29-32; Griffin, *The Fort Ancient Aspect,* pp. 261-67; Helmen, "The Cultural Affiliations and Relationships of the Oliver Farm Site, Marion County, Indiana"; Weer, "Sweeping a Prehistoric Floor," in *Indiana History Bulletin,* XII, No. 5, pp. 161-68; Lilly, *Prehistoric Antiquities of Indiana,* pp. 106-9.

[12] John C. Householder to the author.

[13] Weer, "Sweeping a Prehistoric Floor," in *Indiana History Bulletin,* XII, No. 5, pp. 161-68.

were found to be very nearly identical to those from the Bowen Site. Fabric marking, cord marking, cambered and straight-collared rims usually with cord-impressed decorations, curvilinear guilloche decorations on smooth rims with rim strips, extremely everted undecorated rims, almost exclusively grit tempering, and cord-impressed designs on smooth moderately everted and nearly vertical rims were all included. Other artifacts were bone beamers, triangular unnotched projectile points, bone awls, expanded-base drills, and antler projectile points.

The artifactual similarities to Bowen Site and close physical proximity strongly suggest that these sites were all the result of a similar, if not the same, cultural complex and as such were either the result of a single group of people moving about, a number of closely related groups occupying the sites more or less contemporaneously, or a combination of both of these.

Distant Relationships

Indications of more distant relationships for the Oliver Phase can be found in the pottery discussions of some of the county site surveys published by the Indiana Historical Bureau at irregular intervals. Fort Ancient pottery is found all across the midsection of Indiana from the southeast to the northwest but it is not found in the southwest or in the northeast. Adams, Black, Dragoo, DePaepe, Helmen, Hiestand, and Setzler, found pottery which appears to have been Fort Ancient-related in Martin, Greene, Dearborn, Ohio, Shelby, Starke, Owen, Newton, and Franklin counties.[14]

[14] Adams, William R., *Archaeological Survey of Martin County* (*Indiana History Bulletin,* XXIII, No. 6, Indianapolis, 1946) ; Black, Glenn A., *Archaeological Survey of Dearborn and Ohio Counties* (*ibid.,* XI, No. 7, 1934), and *The Archaeology of Greene County* (*ibid.,* X, No. 5, 1933) ; Dragoo, Don W., *Archaeological Survey of Shelby County, Indiana* (1951), DePaepe, Duane, *An Archaeological Survey of Starke County, Indiana* (1959), Helmen, Vernon R., *Archaeological Survey of Owen County, Indiana* (1950), and Hiestand, Joseph E., *An Archaeological Report on Newton County* (1951), all published by the Indiana Historical Bureau, Indianapolis; Frank M. Setzler, *The Archaeology of the Whitewater Valley* (*Indiana History Bulletin,* VII, No. 12, Indianapolis, 1930).

These, along with the Oliver Phase sites and recently reported curvilinear guilloche materials from a site near Paoli in Orange County, form a clear zone trending northwest-southeast in which Fort Ancient pottery occurs. No pottery recognized as related to that of Fort Ancient was found in Marshall County, in the north-central part of the state or in Warrick, Posey, Gibson, Vigo, Perry, or Spencer, all counties in southwestern Indiana.[15]

After Griffin called attention to the mixed nature of the ceramics of the Oliver Phase, Vernon Helmen undertook to establish the cultural affiliations and relationships of the Oliver Site through an analysis of its pottery.[16] Much of his work was incorporated in the ceramic studies of the present investigation. Helmen did not have the benefit of materials from controlled excavation and suggested temporal differences for the various pottery types. The result was the postulation of a series of occupations by "several traditions."[17] Specifically Helmen saw strong relationships in the cord-impressed pottery, to the Uren Site in Ontario, the Younge Site in Michigan, and the Tuttle Hill and South Park sites of Ohio. At a slightly later period he thought the site was heavily influenced by the Fisher Focus of Illinois, and the Anderson and Madisonville foci of the Fort Ancient Aspect in southeastern Indiana and southwestern Ohio. Unknown to him these materials were all mixed in the same pits and simultaneously deposited.

The following attempts to reconstruct more thoroughly the disparate relationships, by examining various elements or to use an old-fashioned term "trait complexes." The elements involved

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[15] See Curry, Hilda J., *Archaeological Notes on Warrick County, Indiana* (1954), Adams, William R., *Archaeological Notes on Posey County* (1949), Dragoo, Don W., *An Archaeological Survey of Gibson County, Indiana* (1955), Helmen, Vernon R., *Archaeological Survey of Vigo County, Indiana* (1952), Kellar, James H., *An Archaeological Survey of Perry County* (1958) and *An Archaeological Survey of Spencer County* (1956), all published by the Indiana Historical Bureau, Indianapolis.

[16] Helmen, "The Cultural Affiliations and Relationships of the Oliver Farm Site, Marion County, Indiana."

[17] *Ibid.*, p. ii.

include bone beamers, triangular projectile points, Anderson-like, Madisonville-like, Langford-like pottery, collared pottery, cord-impressed pottery, shell tempering, and finally physical anthropology. These will be treated separately and then together to suggest a model for culture change which would accommodate the evidence.

In 1943 Griffin listed at length traits which were found in the various components of the four foci and also the West Virginia sites of the Fort Ancient Aspect.[18] One hundred ninety-one non-pottery traits were tabulated for twenty-two sites. A comparison of the Bowen Site materials was made with those items which occurred in fifteen or more of the Fort Ancient sites. It was felt that these would be common denominators of Fort Ancient.

TABLE 29. *Occurrence or Absence at Bowen Site of Traits Present at 15 or More Fort Ancient Sites*

	Fort Ancient Sites	*Bowen*
1. Shell hoes, perforated —	15	—
2. Canine teeth pendants —	17	+
3. Antler arrow points —	19	+
4. Short antler flakers —	16	+
5. Bone beamers —	16	+
6. Turkey metatarsal awls —	15	+
7. Bone splinter awls —	16	+
8. Whole bone awls —	19	+
9. Expanded-base drills —	15	+
10. Narrowed-poll celts —	16	+
11. Ovoid knives —	15	+
12. Side-notched points —	17	+
13. Serrated triangular points —	15	—
14. Triangular arrow points —	19	+
15. Cache and refuse pits —	15	+
16. Fully extended burials —	15	+
17. Village-site burials —	17	+

Taken altogether there is an impressive Fort Ancient element in the Bowen Site.

The Fisher-like quality of some of the Oliver Phase pottery was first noted by James B. Griffin in reference to Haueisen, Oliver, and other central Indiana sites.[19] More specifically, this Fisher

[18] Griffin, *The Fort Ancient Aspect,* Table XIV facing p. 376.

[19] *Ibid.,* p. 266.

TABLE 30. *Less Frequent Items from Fort Ancient Sites Which Also Occurred at Bowen*

1. Extended burials with knees bent
2. Flexed burials
3. Mortars (Metates)
4. Mullers (Manos)
5. Central depression hammerstones (Anvils)
6. Edge-pecked hammerstones
7. Round hammerstones
8. Whetstones (Abraders)
9. Hematite objects
10. Flint scrapers
11. Double-pointed pins
12. Beaver teeth
13. Raccoon penis bones
14. Long flat needle with eye at end
15. Bone tubes
16. Bone or antler pendants
17. Fishhooks

TABLE 31. *Pottery Traits in Common Between Two Fort Ancient Sites and Bowen*

Madisonville:
1. Shell temper
2. Cord-marked body
3. Cord-marked and smoothed
4. Net-impressed (Fabric marked is term used for Bowen)
5. Incising (Trailing)
6. Punctating
7. Curvilinear guilloche and punctates
8. Rectilinear guilloche
9. Line-filled triangles
10. Curvilinear guilloche and punctates
11. Expanding strap handle
12. Loop handle
13. Rim moderately flared to straight
14. Added rim strip
15. Rounded lip

Anderson:
1. Shell temper
2. Grit temper
3. Cord-marked
4. Cord-marked and smoothed
5. Trailing over cord-marked
6. Trailing over smoothed
7. Punctating
8. Curvilinear guilloche
9. Rectilinear guilloche
10. Line-filled triangle
11. Curvilinear guilloche and punctates
12. Chevron and incised horizontal lines
13. Expanding strap handle
14. Straight to moderately flared rim
15. Rim strip
16. Rim smoothed
17. Rounded lip
18. Flattened lip

quality took the form of short-angled rims, the essential element of the Bowen Sharply Everted Rim type of pottery. The interior angle of the rim-body juncture forms very nearly a right or even more acute angle, and generally the height of the rim is not great, 3 centimeters or less. John W. Griffin differentiated the Fisher Site ceramics into a shell-tempered Fisher series and a grit-tempered Langford series.[20] Therefore, the specific relationship is to the Langford series which was stratigraphically above the shell-tempered materials at the Fisher Site.

[20] Griffin, John W., "The Upper Mississippi Occupation of the Fisher Site, Will County, Illinois" (Master's thesis, University of Chicago, 1946).

At this point it would be well to take note of the fact that the small shell-tempered sherd collection from the Bowen Site reinforces the conclusions that there were Fisher Phase and Fort Ancient Aspect relationships rather than direct Mississippian influences. Of the 147 sherds, 129 were differentiated as to surface treatment. Four were fabric marked, 29 were cord marked, and 96 were smoothed. Twenty-six were rim sherds, and of these ten were decorated. Eight of the ten were decorated with trailed curvilinear guilloche designs and the remaining two were decorated with impressions made with a cord-wrapped dowel. Cord marking, cord-impressed designs, and trailed curvilinear guilloches are not characteristic of Mississippian pottery.

An effort was made by Helmen to link the pottery decorated with various kinds of cord-impressed designs to the Lake Erie area, specifically the Uren Site in Ontario, the Younge Site in southeastern Michigan, and the Whittlesey Focus sites of the same area and northern Ohio.[21] The present writer examined the collections from the sites involved during the summer of 1968 at the University of Michigan Museum of Anthropology's Ceramic Repository for the Eastern United States. While the cord-impressing decorative techniques are present in both the Lake Erie sites and the Oliver Phase sites, the vessel forms, sizes, paste, thickness, and execution are entirely different. The Lake Erie sites produced coarser paste, much thicker vessel walls, conoidal forms, larger and taller vessels, and much more carefully executed decorative designs. Relationships could be only of a remote kind.

Subsequent to Helmen's work a great deal of information has accumulated about the Late Woodland ceramics of Wisconsin and northern Illinois.[22] It has become clear that the affinities of the

[21] Helmen, "The Cultural Affiliations and Relationships of the Oliver Farm Site, Marion County, Indiana," pp. 27-31.

[22] See Baerreis, "Blackhawk Village Site (DA5), Dane County, Wisconsin," in *Journal of the Iowa Archaeological Society*, II, 5-20; Fowler, "Ware Groupings and Decorations of Woodland Ceramics in Illinois," in *American Antiquity*, XX, 213-25; John E. Freeman, "An Analysis of the Point Sauble and Beaumier

Bowen Site cord-impressed ceramics are to Fowler's Canton Ware and Baerreis' Madison Cord-impressed type. Fowler viewed the former as being essentially a development out of Weaver and thus a Late Woodland pottery. Baerreis, however, saw Madison Cord-impressed pottery as Middle Woodland.[23] The resolution of this temporal problem was attempted several times by Baerreis and Freeman, by Wittry, and by Keslin. However, it remained for Mason to solve the dilemma.[24]

Mason reviewed the development of Madison Cord-impressed pottery from a definition by Baerreis as a Middle Woodland type, to Wittry's suggestion of a Madison Ware. He noted that during the years between Baerreis and Wittry the Madison Cord-impressed pottery became a kind of baseline dating mechanism for Effigy Mound in a classic case of circular reasoning. Baerreis noted the presence of some Madison Cord-impressed materials, inclusively, in some Effigy Mound burials and concluded it was thus Middle Woodland. Subsequently, other Effigy Mound sites were then determined to be Middle Woodland on the basis of the presence of Madison Cord-impressed pottery. Keslin and Wittry both built cases for a later temporal placement of the type, but both shied away from drawing a Late Woodland conclusion. Keslin noted the

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Farm Sites" (Master's thesis, University of Wisconsin, 1956); Baerreis, David, and Joan E. Freeman, "Late Woodland Pottery in Wisconsin as Seen from Aztalan," in *Wisconsin Archeologist,* XXXIX (1958), 35-61; Keslin, Richard O., "A Preliminary Report of the Hahn and Horicon Sites, Dodge County, Wisconsin," in *ibid.,* XXXIX (1958), 191-273; Wittry, "Archeological Studies of Four Wisconsin Rockshelters," in *ibid.,* XL, 137-267; Hall, Robert L., *The Archaeology of Carcajou Point* (University of Wisconsin Press, Madison, 1962); Mason, *Two Stratified Sites on the Door Peninsula of Wisconsin.*

[23] Fowler, "Ware Groupings and Decorations of Woodland Ceramics in Illinois," in *American Antiquity,* XX, 219-20; Baerreis, "Blackhawk Village Site (DA5), Dane County, Wisconsin," in *Journal of the Iowa Archaeological Society,* II, 5-20.

[24] Baerreis and Freeman, "Late Woodland Pottery in Wisconsin as Seen from Aztalan," in *Wisconsin Archeologist,* XXXIX, 35-61; Wittry, "Archeological Studies of Four Wisconsin Rockshelters," in *ibid.,* XL, 137-267; Keslin, "A Preliminary Report of the Hahn and Horicon Sites," in *ibid.,* XXXIX, 191-273; and Mason, *Two Stratified Sites on the Door Peninsula of Wisconsin,* pp. 150-58.

systematic association of Madison Cord-Impressed pottery with triangular projectile points in all of the sites known to have the pottery. In spite of the fact that triangular points are a hallmark of later times he persisted in according a Middle Woodland placement to the pottery.[25] Wittry recognized an additional related pottery-type, Madison Plain, and lumped it with the Madison Cord-Impressed to form a Madison Ware. Wittry also extended the demonstration of association between the Ware and triangular projectile points, as well as noting the association of both with effigy burial mounds. Of great importance also was his relating of Madison Ware to Fowler's Canton Ware. In the face of this evidence of a Late Woodland affiliation he still maintained a Middle Woodland time level for Madison Ware by citing Baerreis' original and tenuous conclusion.[26]

Mason, citing Keslin and Wittry, noted that "Madison Cord-impressed and related collared forms have been almost the only types of pottery known to occur as deliberate inclusions in effigy mounds in Iowa and Wisconsin and, as far as I have been able to determine, the dominant, if not only, type of associated projectile point is the triangular type." Citing seriational and excavation data from Iowa, contemporaneity and close relationships to Canton Ware, and his own interpretation of the Heins Creek and Mero sites, Mason concludes that Madison Cord-impressed pottery is ". . . a Late Woodland phenomenon whose ultimate roots, through Lane Farm Cord-impressed and similar pottery, may be traceable into late Middle Woodland times."[27]

Suggested dates range from A.D. 230± 150 for the Lane Farm material at the Harper's Ferry Mound group in Iowa,[28] to

[25] Keslin, "A Preliminary Report of the Hahn and Horicon Sites, Dodge County, Wisconsin," in *Wisconsin Archeologist,* XXXIX, 262.

[26] Wittry, "Archeological Studies of Four Wisconsin Rockshelters," in *ibid.,* XL, 218, 260-61.

[27] Mason, *Two Stratified Sites on the Door Peninsula of Wisconsin,* pp. 154-55, 157.

[28] Crane, H. R., and James B. Griffin, "University of Michigan Radiocarbon Dates VI," in *Radiocarbon,* III (1961), 113.

A.D. 776± 250 for Madison Cord-impressed pottery at Kolterman Mound 18 in Wisconsin,[29] to A.D. 1023± for Mound 30 at Effigy Mounds National Monument,[30] and A.D. 1208± 200 for Mound 16 of the Wakanda Park effigy mound group.[31] The single date available at present for the Oliver Phase is from the Oliver Site, A.D. 1060± 100 (M-2010).

The date, cord-impressed pottery with triangular unnotched projectile points, and related cord-impressed and collared pottery types all point to contemporaneity in part and close relationships between the Oliver Phase and the Late Woodland Canton and Madison ware.

The association of Madison Ware with collared pottery varieties opens another question of relationships for the Bowen Collared type. Straight or thickened collared rims occur on numerous pottery types across the northern United States and southern Canada, from the plains eastward. In Wisconsin the appearance of collared rim types with Madison Ware took place well into Late Woodland times.[32] In northern Michigan, collared forms have been accorded a Late Woodland status dated from A.D. 1070 to 1330.[33]

Of particular interest are the cambered collared rims since they indicate more northwesterly influences. Cambered and cambered collared rims, often referred to as S shaped, were one of the most common elements of what Hurt designated in South Dakota as the Chamberlain Aspect and Lehmer and Caldwell termed the

[29] M-389; Wittry, Warren L., "Kolterman Mound 18 Radiocarbon Date," in *Wisconsin Archeologist*, XXXVII, No. 4 (1956), pp. 133-34.

[30] M-41; Beaubien, Paul L., "Cultural Variation within Two Woodland Mound Groups of Northeastern Iowa," in *American Antiquity*, XIX, No. 1 (1953), pp. 56-66.

[31] M-814; Wittry, Warren L., "The Wakanda Mound Group, Dn 1, Menominie, Wisconsin," in *Wisconsin Archeologist*, XL, No. 3 (1959), p. 112.

[32] Hall, *The Archaeology of Carcajou Point*, pp. 82-83; and Mason, *Two Stratified Sites on the Door Peninsula of Wisconsin*, pp. 156-57.

[33] McPherron, Alan, *The Jactunen Site and the Late Woodland Prehistory of the Upper Great Lakes Area* (University of Michigan Museum of Anthropology, *Anthropological Papers*, No. 30, Ann Arbor, 1967), pp. 110-16.

Initial Middle Missouri Horizon and dated at A.D. 800 to 1300.[34] Hurt and Spaulding both concluded that the origins of the Chamberlain Aspect lay to the east in southwest Minnesota and to the southeast in Iowa.[35] Great Oasis and Mill Creek elements and particularly the S-shaped, cord-impressed rim of Cambria Type B pottery were cited as the most important evidences. Ultimately it is very probable that the derivation of the cambered collared-rim pottery of the Oliver Phase sites is from these distant areas. Clear evidence of ties to the Wisconsin area via Madison Ware becomes even more meaningful in light of Wood's summary of the Chamberlain Aspect. "Ceramics strongly suggest that the Chamberlain Aspect was a composite group, if not a participant in a broad exchange of ideas with groups in Minnesota, Wisconsin, and Iowa."[36] All of these groups, the Chamberlain Aspect, Cambria Phase, Mill Creek, Great Oasis, and Wisconsin Late Woodland have in common a peripheral Mississippian location with substantial Mississippified acculturation but even more pronounced evidence of interaction among themselves.

Recently, O'Brien has reported the occurrence of cambered rims in the pottery from the Powell Tract at Cahokia. She concludes that they also are the product of ideas received from the Mill Creek–Cambria–Middle Missouri area of Iowa, South Dakota, and Minnesota. The suggested date of A.D. 1000-1200[37]

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[34] Hurt, Wesley R., Jr., *Report of the Investigation of the Thomas Riggs Site, 29 Hu 1, Hughes County, South Dakota, 1952* (South Dakota Archaeological Commission, *Archaeological Studies,* Circular No. 5, Vermillion, 1953), p. 47; Lehmer, Donald J., and Warren W. Caldwell, "Horizon and Tradition in the Northern Plains," in *American Antiquity,* XXXI, No. 4 (1966), p. 515.

[35] Hurt, *Report of the Investigation of the Thomas Riggs Site, 29 Hu 1, Hughes County, South Dakota, 1952,* pp. 57-58; Spaulding, Albert C., *The Arzberger Site, Hughes County, South Dakota* (University of Michigan Museum of Anthropology, *Occasional Papers,* No. 16, Ann Arbor, 1956), pp. 96-99.

[36] Wood, Raymond, *An Interpretation of Mandan Culture History* (Bureau of American Ethnology, *Bulletin 198, River Basin Survey Paper No. 39,* Washington, D. C., 1967), p. 120.

[37] O'Brien, Patricia J., "The Chronological Position of the Cambered Jar at

for the Cahokia cambered-rim material is perfectly in line with the dating of the Oliver Phase.

Late in this study the author's attention was called by Roy S. Dickens to similarities between the straight variety of the Bowen Collared Rim and Pisgah pottery of western North Carolina. Specific study of such a relationship is needed.

An important consideration often left uninterpreted in an archaeological report is the human physical remains. Neumann's 1952 attempt[38] at outlining basic physical groups among American Indians, both living and prehistoric, has for many years been the object of attack by zealous disbelievers in the usefulness of a morphological and metrical approach to ordering physical relationships. Still today the only pragmatic way yet determined to accomplish such ordering with prehistoric populations revolves around a combination of morphological observation and metrical analyses. Original criticisms of sample size were justified by the subsequent need for substantial changes in the 1952 paper. Nonetheless, it is now possible to point to a number of specific instances in which the analyses are borne out by archaeological evidences and/or vice versa. Recently Robbins was able to demonstrate that the Baum, Feurt, and Anderson foci of Fort Ancient were essentially Ilinid populations, while the Madisonville Focus was clearly an Ilinid population into which a marked Muskogid population intruded but did not particularly mix.[39]

The Fisher Site population was determined to be mixed Ilinid and Dakotid.[40] Neumann has called the author's attention to the

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Cahokia and Its Implications," in *American Antiquity,* XXXIV, No. 4 (1969), pp. 411-16.

[38] Neumann, Georg K., "Archaeology and Race in the American Indian," in *Archaeology of Eastern United States,* edited by James B. Griffin (University of Chicago Press, 1952).

[39] Robbins, "The Identification of the Prehistoric Shawnee Indians—The Description of the Population of the Fort Ancient Aspect."

[40] Omoto, Constance E., "The Identification of a Prehistoric Indian Skeletal Series from Will County, Illinois" (Master's thesis, Indiana University, Bloomington, 1960).

mixed Ilinid and Dakotid nature of such peoples at Maples Mills, a primary source of Canton Ware pottery. The slightly mixed, Ilinid-Muskogid nature of the Bowen Site population has already been noted above (pp. 294-95). The important consideration is that a commonality of the artifactually related complexes is that all are physically mixed Ilinid and either Muskogid or Dakotid. Late Woodland populations were basically Ilinid, while Mississippian peoples of the middle Mississippi Valley were basically Muskogid and those of the northern Mississippi Valley and the middle Missouri Valley were Dakotid. Thus, there is physical evidence that the people making the Woodland and Mississippian mixed pottery styles were themselves mixed populations.

Dating

At present only a single C14 date has been recorded for an Oliver Phase site. This is the date of A.D. 1060± 100 (M-2010) from the Oliver Site. Large carbon samples from two pits at the Bowen Site were divided and part of each sent to the University of Michigan Memorial-Phoenix Project Laboratory and part sent to the Indiana University Carbon 14 Laboratory.

Sample *1099/2578* was from Feature 46, a large circular pit 4.5 feet in diameter, located at the juncture of Blocks 30, 35 46, and an unnumbered block of the 1960 excavation. The bottom .6 foot was clearly a heavily burned area with charred corn, charred wood, considerable ash, and a large number of heat-cracked rock fragments. Bright red burned earth covered the floor and extended up the walls for some .8 foot, indicating a fire of considerable intensity. The sample was from some of the wood which was not completely consumed by the fire. In all probability the fire was smothered by dirt before it burned out.

Sample *1099/4705* was from Feature 88, a large rectangular refuse pit some 7 by 6 feet and 2.6 feet deep. There was no concentration of red burned soil, indicative of *in situ* burning. Rather the appearance was one of a pit which was filled with refuse including a dog which had been placed in the pit after it had been

partially filled with other debris. The sample consisted of pieces of charred wood found immediately below the dog.[41]

On a cross cultural basis the Oliver Phase sites are viewed as being related to a number of Late Woodland and Upper Mississippi complexes which date to between A.D. 800 and 1300. It is most probable that the middle range or later is involved at the Bowen Site and its nearby contemporaries.

The Role of the Frontier in Cultural Transmission

The external influences indicated at the Oliver Phase sites have a unique geographic distribution. They appear to come from areas which lie along a line drawn roughly from the juncture of South Dakota, Iowa, and Minnesota, southeastward across southern Wisconsin, northern Illinois, central Indiana, southern Ohio, West Virginia, and possibly into North Carolina. Direct influence from the Mississippian area of southwestern Indiana appears to have been slight. Influences from the northeast would be more difficult to sort out but do not appear to be very substantial.

Potential reasons for this distribution of sources of external cultural influences were sought without success in climate, soil, flora, fauna, and in general environment and ecology. The linear nature of the distribution suggested a boundary of some sort but no limits from any of the above were found which could support the idea.

In a general way the line does, however, conform to the outer limits of direct Mississippian expansion. All along it the post

[41] Subsequent to the completion of the manuscript and its preparation for publication, two C14 dates were received from the Indiana University Carbon 14 Laboratory. Sample 1099/2578 produced a date of A.D. 1060 ± 130 (IU 121). Sample 1099/4705 produced a date of A.D. 1110 ± 130 (IU 122). These are in extraordinary agreement with the Oliver Site date and lend support to the thesis that reuse of the sites occurred periodically, but not necessarily annually, with sufficient time passage for people to have forgotten the exact grave locations of previously buried individuals. No report had been received from the University of Michigan Memorial-Phoenix Project Laboratory when the manuscript went to press.

A.D. 1000 sites are directly or indirectly Mississippian influenced. North and east of the line, Mississippian elements are less pronounced, while to the south they are more common. In a general way this is a frontier zone between expanded Mississippian culture and other indigenous cultures. This frontier zone probably played the important role in the unique congregation of culture elements, particularly in the ceramics, which were found at the Bowen Site and other Oliver Phase sites.

Anthropologists have, for many years, been concerned with the processes involved in the transmission of cultural traits, both material and nonmaterial, from one culture to another. A vast literature accumulated from the 1930s to the 1950s, which dealt with diffusion, acculturation, and culture change. A number of models of the processes were developed.[42] In 1938 Herskovits defined diffusion as "that aspect of culture change which includes the transmission of techniques, attitudes, concepts and points of view from one people to another; whether it be through the medium of a single individual or a group, or whether the contact is brief or sustained."[43] In 1953 the Social Science Research Council Seminar on Acculturation defined acculturation as follows: ". . . acculturation (is) . . . culture change that is initiated by the conjunction of two or more autonomous cultural systems."[44] Culture change is the label generally applied to whatever kind of alteration takes place in the content or structure of a culture. Diffusion applies to change which is induced from outside by whatever kind of mech-

[42] Redfield, Robert, Ralph Linton, and Melville J. Herskovits, "Memorandum for the Society of Acculturation," in *American Anthropologist,* XXXVIII (1936), 149-52; Barnett, Homer G., Leonard Broom, Bernard J. Siegel, Evon Z. Vogt, and James B. Watson, "Acculturation: An Exploratory Formulation," in *ibid.,* LVI, No. 6, pt. 1 (1954), pp. 970-1000; Barnett, Homer G., *Innovation: The Basis of Culture Change* (McGraw-Hill, New York, 1953).

[43] Herskovits, Melville J., *Acculturation: The Study of Culture Contacts* (J. J. Augustin, New York, 1938), p. 14.

[44] "Acculturation: An Exploratory Formulation," in *American Anthropologist,* LVI, No. 6, pt. 1, p. 974. Members of the seminar were Homer G. Barnett, Leonard Broom, Bernard J. Siegel, Evon Z. Vogt, and James B. Watson.

anism, while acculturation specifies cultures in direct contact. Thus, diffusion is one mechanism of culture change and acculturation is one mechanism of diffusion.

Recently, Marvin Harris attacked diffusion as a "non-principle," noting that "under no circumstances can geographical-historical propinquity constitute a valid explanation of cultural differences and similarities." Arguing from the point of view that diffusion does not *explain* origins, he suggested that only studies of causality and factors involving differential acceptance patterns were a valid course for anthropology in diffusion studies.[45] The concept of diffusion is, indeed, not explanatory in the sense of making possible specific predictions. However, it does, as a theoretical model, generate methodologies for studying culture process, and as such, concern with it is a legitimate intellectual activity for anthropologists. It is particularly in the area of differential acceptance patterns that the author is concerned here, and an attempt will be made to show an example of how the concept of diffusion remains a primary and useful tool which can be of significant value in the anthropological study of archaeological data.

In order to do this the author will attempt to show how differential acceptance and rejection of diffusing cultural elements can in part be explained by using the model of culture change developed by Homer G. Barnett.[46] Further there will be an attempt to show that peculiarities of distribution which are likely to come to light only in the relatively uncluttered context of archaeological data, may be the result of such differential patterning of diffusion.

In his 1953 work, *Innovation: The Basis of Culture Change,* Barnett dealt with, among other things, the cultural background of innovation. This background is, of course, one of the crucial factors determining the amount of innovative activity in a culture.

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[45] Harris, Marvin, *The Rise of Anthropological Theory* (Thomas Y. Crowell, New York, 1968), pp. 377-78.

[46] Barnett, *Innovation: The Basis of Culture Change.*

Nine items of cultural background were listed and examined in detail.[47]

These were:

1. The accumulation of ideas
2. The concentration of ideas
3. The collaboration of effort
4. The conjunction of differences
5. The expectation of change
6. The dependence upon authority
7. The competition of rivals
8. The deprivation of essentials
9. The modification of a dominant correlate

These were seen as the cultural conditions affecting sustained innovation in a culture. A change in the level of any of the nine would result in a corresponding change in the quantity of innovative activity in a particular culture.

Let us briefly examine these. In order for innovation and thus for change to take place, ideas must accumulate. Innovations are based on the recombination of old ideas, the arrival from outside of new ideas, or the combination of both of these. Accumulation is thus absolutely essential since without an accumulated body of data, there would be nothing to recombine. Obviously the greater the accumulation, the greater the possibilities for innovation. Accumulation alone, however, is not enough, since the concentration of ideas into close proximity permits new combinations to occur more readily. A culture may possess two separate pieces of information but until they are brought together in a single mind, no innovation will be forthcoming.

The third element for innovative behavior was the collaboration of effort. When there is cultural support for the exchange of ideas and give-and-take response or team effort and co-operation, there are likely to be more innovations resulting.

[47] *Ibid.*, pp. 39-95.

The conjunction of differences simply points to the fact that,

> It is unquestionable that the apposition of alternate values, things and usages can bring about an entirely new concept that is qualitatively distinct from either of the alternatives. Furthermore, the conjunction of such differences can be a stimulus for the emergence of some new idea deriving from them. The difference itself induces change.[48]

The expectation of change is largely self-explanatory since it is obvious that when change is an expected part of a culture, then innovations will be more likely to occur, given the other variables.

Where dependence upon authority exists, there is an inverse relationship to innovation. The more dependence, the less innovation. The competition of rivals produces more innovative activity than would otherwise be the case. In his discussion of the effect of the deprivation of essentials, Barnett is pointing out the increased probability of innovations as a consequence of the attention paid to the restoration of a cherished value, or to the prevention of its elimination. The last item, the modification of a dominant correlate, is concerned with the fact that innovations never take place in a vacuum but are interrelated. Thus, when a primary innovation occurs, there are many secondary and farther removed innovations which take place as a result of the dominant or primary change.

The principle concern here is with numbers four and five, the conjunction of differences and the expectation of change. The conjunction of differences, as a stimulus to new ideas, was itself not new with Barnett. He borrowed it from Frederick Teggart,[49] as the writer borrows from Barnett, an excellent example of the whole process. There is no doubt that confrontation with alternatives produces conjunctions of different ideas, out of which innovations are likely to flow. Thus, if the peripheries of two relatively autonomous cultures are in conjunction, there is confrontation with alternatives, and innovations, be they simple borrowings or combinations, result. The same situation engenders the development of

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[48] *Ibid.*, p. 46.

[49] Teggart, Frederick, *The Processes of History* (Yale University Press, New Haven, 1918), p. 112.

a substantial expectation of change. The entire zone which includes the margins of the two original cultures is thus an area in which culture change is expected, therefore, enriching and enhancing the innovative process. As a result, ideas and innovations tend to flow much more freely in this zone than in either of the original cultures. There is produced in this frontier transfer zone a substantial diffusion pattern which is most notable for its linearity.

It is thought that the zone exists wherever two cultures have a common, even though imprecisely definable border. Thus one culture which is bordered by other cultures on all sides would have a transfer zone around its entire perimeter, while geographical factors might limit in part or entirely the formation of such a zone around another culture.

Kroeber discussed resistance to diffusion as the focal point in the differential spread of cultural elements. He noted that any established feature automatically tended to spread but that its success depended upon the factors preventing such spread. Smoothing the preventative factors increases the success.[50]

The Greek concept of *Oikoumenê,* "the inhabited world" or "civilized world," was used by Kroeber to mean the total area reached by a set of traceable influences diffused from a main center.[51] Willey examined an American *Oikoumenê* in which the high cultures of Mesoamerica were given predominance with Peru having a secondary center status.[52] Caldwell applied the concept to the late prehistory of the eastern United States. He saw the latter as a marginal area of Willey's American *Oikoumenê.*[53]

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[50] Kroeber, A. L., *Anthropology* (Harcourt, Brace and World, Inc., New York, 1948), pp. 415-18.

[51] *Ibid.,* p. 423, and Kroeber, A. L., "The Ancient Oikoumenê as a Historical Culture Aggregate," in *The Nature of Culture* (University of Chicago Press, Chicago, 1952), pp. 379-95.

[52] Willey, Gordon R., "The Prehistoric Civilizations of Nuclear America," in *American Anthropologist,* LVII, No. 3, pt. 1 (1955), pp. 571-93.

[53] Caldwell, Joseph R., *Trend and Tradition in the Prehistory of the Eastern United States* (American Anthropological Association *Memoir No. 88,* Menasha, Wis., 1958).

The relationship of eastern United States to the American *Oikoumenê* is the same as that of the frontier transfer zone to a specific culture.

In the eastern United States by about A.D. 1000, Mississippian expansion had reached a line which on its northeast frontier was made up of the Fort Ancient Aspect, Oliver Phase, Fisher Focus, Oneota Aspect, Mill Creek Phase, and Cambria Phase. To be sure, there were Mississippian influences far beyond this line, but there appears to have been a marked decrease in their intensity. Generally speaking, these groupings form at least part of the frontier transfer zone of Mississippian–Woodland cultures of that time. The zone probably extended all around the periphery of expanded Mississippian Culture. The important addition to our understanding of the similarities and dissimilarities exhibited by the occupants of the transfer zone is that, while each phase was the product of somewhat localized Woodland and Mississippian assimilation and replacement, each was also influenced by other parts of the transfer zone.

The Oliver Phase sites are perhaps best understood in terms of the frontier transfer zone model. As demonstrated in the previous section, the S-shaped pottery vessel rim is a distinctive characteristic of the Cambria–Mill Creek complexes on this time level. In *The Fort Ancient Aspect* Griffin illustrated two rim profiles from the Fisher Site which look very much as though they were slightly cambered.[54] In describing rim shapes for Fisher–Langford pottery, he stated that there occurred a "type of rim [which] forms a sharp angle with the shoulder and rises vertically, with a slight though definite camber." Griffin also noted that there were a number of similarities between Oneota and Fisher as well as Fort Ancient and Fisher and suggested that Fisher might hold an intermediate position between Oneota and Fort Ancient.[55]

The marked ties of the Oliver Phase to Fort Ancient, Fisher–

[54] Fig. 16, nos. 11 and 12, p. 364.

[55] *The Fort Ancient Aspect*, pp. 276-77, 283-84.

Oneota, and beyond to Cambria–Mill Creek clearly define the frontier transfer zone of which we have been speaking. The commonalities of Fort Ancient, Fisher, and Oneota caused Griffin, and McKern before him, to group them as the Upper Mississippi Phase and to suggest that they had cultural exchanges.[56]

The present study has simply filled in some of the holes, extended the distances and kinds of the exchanges, and suggested a theoretical model which would tend to produce just such a complexity of borrowings as Griffin noted. This can only be viewed as a beginning in understanding the principles involved since it has dealt almost exclusively with ceramics. Pottery does not a culture make, but cultural relationships it does suggest. A great many more investigations of specialized kinds will be necessary to validate these suggestions.

[56] *Ibid.*, p. 302.

APPENDIXES

Appendix I. Pottery Punch Card Code

Columns 1-4 — Catalogue Number

Columns 5-7 — Block number (given only if not from a feature)

Columns 8-10 — Feature number (if this number is given, there is no Block number recorded)

Column 11 — Level number (given only for Blocks)

- 0 = 0-.8 feet
- 1 = .81-1.2
- 2 = 1.21-1.6
- 3 = 1.61-2.0
- 4 = 2.01-2.4
- 5 = 2.41-2.8
- 6 = 2.81-3.2
- 7 = 3.21-3.6
- 8 = 3.61-4.0

Column 12 — Temper

- 0 = Grit
- 1 = Shell
- 2 = Shell and grit

Column 13 — Surface treatment

- 0 = Smooth
- 1 = Cord marked
- 2 = Smoothed and cord marked
- 3 = Fabric marked
- 4 = Smoothed and fabric marked

Column 14 — Rim Profile

- 0 = Sharply everted
- 1 = Moderately everted or flared
- 2 = Slightly everted or straight
- 3 = Incurving
- 4 = Straight Collar
- 5 = Cambered Collar

Column 15 — Lip

- 0 = Rounded
- 1 = Flattened
- 2 = Beveled
- 3 = Rolled
- 4 = Impressed-scalloped
- 5 = Impressed-notched
- 6 = Impressed-channeled
- 7 = Impressed transversely
- 8 = Missing
- 9 = Incised-notched

Column 16 — Rim addition

- 0 = Plain
- 1 = Rim fold
- 2 = Rim strip
- 3 = Extruded

Column 17 — Handles

- 0 = None

APPENDIX I. POTTERY PUNCH CARD CODE—continued

1 = Strap handle

2 = Vertical lug

3 = Loop handle

Column 18 Castellation

0 = No

1 = Yes

Column 19 Decorative techniques

0 = None

1 = Short cord impressions set close together

2 = Short cord impressions set apart

3 = Trailed lines without other techniques

4 = Trailed lines with gashing on upper rim

5 = Fine-line incised

6 = Punch and drag

7 = Linear punctate

8 = Circular punctate

9 = Trailed and punctate

Columns 20-21 Decorative motifs

00 = Curvilinear guilloche

01 = Rectilinear guilloche

02 = Horizontal zigzag in multiple lines around rim

03 = Two-row chevron

04 = Three-row chevron

05 = Four-row chevron

06 = Chevron turned on side

07 = Unknown number rows of chevrons

08 = Unknown number horizontal rows

09 = Two horizontal rows

10 = Three horizontal rows

11 = Four horizontal rows

12 = Two-row chevron and horizontal row alternating

13 = Three-row chevron and horizontal row alternating

14 = Four-row chevron and horizontal row alternating

15 = Amorphous

16 = Other

17 = Unknown

18 = Barred triangle

19 = Triangles

20 = Horizontal rows of oblique elements

Appendix I. Pottery Punch Card Code—continued

21 = Horizontal rows of elements placed in obliquely alternating fashion

22 = Alternating sets of horizontal and vertical rows

23 = Short vertical rows

24 = Concentric semicircles

25 = Nested Vs

26 = Chevrons of alternating techniques

27 = Vertical and horizontal cord impressions alternating with circular punctates

Columns 22-23 Number of such sherds

Columns 24-25 Maximum number of vessels involved

Appendix II. Occurrence of Motifs by Technique

Technique Number	*Motifs*
1	03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 17, 18, 20, 22, 23, 24, 25, 26, 27
2	03, 04, 07, 08, 09, 10, 11, 13, 15, 17, 20, 21, 23, 24
3	00, 01, 02, 17, 18, 20
4	00, 17
5	00, 02, 07, 17, 18, 20, 21, 25
6	04, 07, 08, 09, 10, 11, 14, 15, 17, 20
7	04, 05, 07, 08, 10, 11, 16, 17, 18, 24
8	03, 15, 06, 07, 08, 09, 11, 13, 14, 16, 17, 25
9	00, 18, 19

Appendix III. Occurrence of Techniques by Motifs

Motif	*Technique*	*Quantity*
00	3	608
	4	11
	5	14
	9	2
01	3	10
02	3	21
	5	2
03	1	24
	2	1
	8	1
04	1	87
	2	8
	6	1
	7	2
05	1	33
	7	10
	8	1
06	1	6
	8	1
07	1	95
	2	7
	5	1
	6	2
	7	6
	8	3
08	1	75
	2	11
	6	6
	7	14
	8	1
09	1	16
	2	10
	6	1
	8	3
10	1	79
	2	21
	6	22
	7	21
11	1	31
	2	21
	6	4
	7	18
	8	1
12	1	2
13	1	9
	2	5
	8	1
14	1	18
	6	1
	8	4
15	1	10
	2	2
	6	1
16	7	1
	8	1
17	1	28
	2	4
	3	3
	4	1
	5	7
	6	3
	7	4
	8	2
18	1	1
	3	4
	5	3
	7	1
	9	1
19	9	9
20	1	3
	2	3
	3	1
	5	2
	6	1
21	2	6
	5	1
22	1	1
23	1	2
	2	2
24	1	1
	2	1
	7	1
25	1	1
	5	1
	8	1
26	1	2
27	1	1

Appendix IV. Tempering of Pottery by Motif

Motif	*Grit*	*Shell*	*Motif*	*Grit*	*Shell*
00	632	8	14	23	0
01	10	0	15	13	0
02	23	0	16	2	0
03	26	0	17	52	0
04	98	0	18	10	0
05	44	0	19	9	0
06	7	0	20	10	0
07	114	0	21	7	0
08	107	1	22	1	0
09	30	0	23	4	0
10	143	0	24	3	0
11	75	1	25	3	0
12	2	0	26	2	0
13	15	0	27	1	0

Appendix V-A. Distribution of Surface Treatment and Temper of Body Sherds Occurring in Features

	Grit Tempered			*Shell Tempered*		
Feature	*Cord marked*	*Fabric*	*Smooth*	*Cord marked*	*Fabric*	*Smooth*
1						
2						
3	400	35				
4						
5	676	87		1		
6						
7						
8						
9						
10						
11	55	6				
12						
13	33					1
14	7					
15	51	2	1			
16						
17						
18						
19	39	2				
20	52	4				
21				1		
22						
23	17	3				
24	23					

APPENDIX V-A. DISTRIBUTION OF SURFACE TREATMENT AND TEMPER OF BODY SHERDS OCCURRING IN FEATURES—continued

	Grit Tempered			*Shell Tempered*		
Feature	*Cord marked*	*Fabric*	*Smooth*	*Cord marked*	*Fabric*	*Smooth*
25						
26	3					
27	9					
28	134	16	4			2
29						
30						
31	13					
32	49	7				
33			1			2
34	43					
37	35	5				
38	25					
39	291		1	1		
40	91	39				2
41						
42	415	1				1
43	34					
44	10					
45	65		2			
46	106	3	2			
47	82	3				
48	87	4		6		23
49	63	17	2			
50	78		2			
51	50	7				
52	16					
53	4					
54	4		1			
55	46					
56	134		3			
57	46		2			
58	4					
59	36					
60	255		3			
61	98					
62	145					
63	111		1			
64	46					
65	97	3	2			
66	79	1				
67	47		1			
68	330	15	7			
69	462	16	14	2		
70						
71	2					
72	39	1	2			
73	79	12				
74	50	6				

APPENDIX V-A. DISTRIBUTION OF SURFACE TREATMENT AND TEMPER OF BODY SHERDS OCCURRING IN FEATURES—continued

	Grit Tempered			*Shell Tempered*		
Feature	*Cord marked*	*Fabric*	*Smooth*	*Cord marked*	*Fabric*	*Smooth*
75	54	3				
76	56	2				
77	29	5				
78	69	11				
79	67	3	1			
80	24	2	1			
81	9	1				
82	23					
83	11					
84	4	2				
85	26	2				
86	91	8				
87	13	4				
88	501	55	17			1
89	285	6	2			
90	198		5			
91	10					
92	527	53	25			
93	29	2	2			
94	49					
95	89					
96	29					
97	80					
98	47		2			
99	22	1				
100	2					
101	19	1				
102	29	6				
103	2					
104	2					
105	120	1	1			
106	147					
107	148				1	
108						
109	6					
110	212	3	3			
111	191					
112	414	3	13	4		
113						
114						
115	66		12		1	3
116	61		6			
117	242	3	1			
118	24					
119	312	1	14			
120	8					
TOTAL	9,513	473	156	15	2	35

APPENDIX V-B. DISTRIBUTION OF SURFACE TREATMENT AND TEMPER OF BODY SHERDS OCCURRING IN BLOCKS

	Grit Tempered			*Shell Tempered*		
Block	*Cord marked*	*Fabric*	*Smooth*	*Cord marked*	*Fabric*	*Smooth*
2	1					1
3	127					2
4	277	3	1			1
5	358	12	1		3	2
6	51	4				
11	32					
13	16	2				
14	130	5	1			1
15	61	3	2	2		
16	99	7	3			1
17	41					
18	218	39	9			29
19	57	3	2			1
21	13					
22	5					
24	3					
25	10					
26	3					
27	153	17	1			
28	14	2				
29	39	8				1
30	71		3			
31	22	1	1			
32	21					
33	2					
35	26	1				
36	19		2			
37	68					
38	46		1			
39	13					
40	8					
41	50					
42	35					
43	8					
44	12	2				1
45	21	5		1		1
46	36		7			
47	4					
48	1					
50	143					
51				1		
54	20					
56		2				
57	7	2				
58	16	3				
59	13	3				
60	7	4				

APPENDIX V-B. DISTRIBUTION OF SURFACE TREATMENT AND TEMPER OF BODY SHERDS OCCURRING IN BLOCKS—continued

	Grit Tempered			*Shell Tempered*		
Block	*Cord marked*	*Fabric*	*Smooth*	*Cord marked*	*Fabric*	*Smooth*
61	4					
62	9					
63	6					
64	3	3	1			
65	6		2			
66	5					
70	11					
71	7					
72	22	6	2			
73	6					
76	17					
77	7					
78	35					
79	89		2			
80	40					
81	43					
83	17					
84	6					
85	2					
86	63					
87	38					
88	60					
89	205					
90	120					
91	86		2			
92	9					
93	10					
94	38					
95	67					
96	207		4			
97	101		3			
98	7					
99	12					
100	77		3			
101	30	3				
102	10	1				
103	5					
104	17					
105	19					
106	68	1				
107	22	3				
108	8	1				
109	60					
110	1					
113	19	1				
114	10					
115	26	2	1			
116	26	1				

APPENDIX V-B. DISTRIBUTION OF SURFACE TREATMENT AND TEMPER OF BODY SHERDS OCCURRING IN BLOCKS—continued

	Grit Tempered			*Shell Tempered*		
Block	*Cord marked*	*Fabric*	*Smooth*	*Cord marked*	*Fabric*	*Smooth*
117	17	1				
118	59	19				
119	27					
120	28	1	1			
121	13					
122	49	2	3			
123	27	4				
124	19					
125	12					
126	23	1				
127	242	23	11			1
128	220	26	2	1		
129	110	1				
130	13	3	1			1
131	25		2			
132	31	1				
133	22					
134	49	11				
135	10	3				
136	29	3				
137	27	1				
138	13	2				
139	21	1				
140						
141	164		4			
142	8					
143	3					
144	51	1				
145	30					
146	4					
147	86	7				
148	33	1				
149	1					
150	16					
151	47	2				
152	62					
153	32	1			1	
154	43		1			
155	65	3	1			
156	55	3				
157	44	5				
158	84	9				
159	10	4	1			
160	29	6				
161	22	3				
162	2	2				
163	13	1	1			
164	18	5				

APPENDIX V-B. DISTRIBUTION OF SURFACE TREATMENT AND TEMPER OF BODY SHERDS OCCURRING IN BLOCKS—continued

	Grit Tempered			*Shell Tempered*		
Block	*Cord marked*	*Fabric*	*Smooth*	*Cord marked*	*Fabric*	*Smooth*
165	16		2			
167	21					
168	5					
170	49					
171	9					
180	69					
181	11					
195	77	1	8			
196	11					
211	4		1			
212	33					
214	78					
225	44					
226	74	9	1			
227	586		1			
228	59					
229	15					
230	27					
231	19	2				1
232	7					1
233	29	2				
239	22					
241	22					
242	104					
244	48					
*TOTAL	7,580	320	95	5	4	45

* The totals given in Appendix V-A, B, and C do not necessarily agree with Table 8 (p. 248) since the latter includes rim-body junctures and the former do not.

APPENDIX V-C. SHERDS UNDIFFERENTIATED BY TEMPER

Grit-tempered Body Sherds		
Area B	11	
Area A	521	
Shell-tempered Body Sherds	7	
All Areas:		
Grit-tempered Body Sherds		1,118
Grit-tempered Rims		363
Shell-tempered Body Sherds		5
Shell-tempered Rim		1

APPENDIX VI. POTTERY DESCRIPTION CHECKLIST FORM FOR THE BOWEN SITE

Excavation Unit.....Feature.....Catalogue No.....

Level.....Number of sherds.....

— — — — — — — — — — — — — — — —

Rim	Body	Rim-Body juncture without lip
Shell temper	Grit temper	Textile impressed
Smoothed	Cord marked	

— — — — — — — — — — — — — — — —

Everted Rim

Extreme (characterized by rim-body juncture forming 90° angle)

Flattened lip	w/rim fold
Rounded lip	w/rim strip
Impressed lip	castellated
Transverse oblique	plain
Channeled	
Scalloped	
Rolled lip	

Moderate (rounded rim-body juncture)

Flattened lip	w/rim fold
Rounded lip	w/rim strip
Impressed lip	castellated
Transverse oblique	plain
Channeled	
Scalloped	
Rolled lip	

Slight to straight (no appreciable juncture)

Flattened lip	w/rim fold
Rounded lip	w/rim strip
Impressed lip	castellated
Transverse oblique	plain
Channeled	
Scalloped	
Rolled lip	

APPENDIX VI. POTTERY DESCRIPTION CHECKLIST FORM FOR THE BOWEN SITE—continued

Collared Rim

S variety

Flattened lip — w/vertical lug
Rounded lip — w/out vertical lug
Impressed lip
Transverse oblique
Channeled

Thickened variety

Flattened lip — Punctated lip
Rounded lip
Impressed lip
Transverse oblique
Channeled

Thickened Rim

Beveled lip
Rounded lip

Rim Decoration

None

Curvilinear guilloche

Rectilinear guilloche

Vertical zig-zag in multiple lines 2-3

Close set small cord wrapped implement impression
2 rows chevron
3 rows horizontal
4 rows both

Wide-spaced small cord-wrapped implement impression
2 rows chevron
3 rows horizontal
4 rows both

Incising
design unknown
design known (specify)

Amorphous cord impression

Cord impression and circular punctate

Appendix VI. Pottery Description Checklist Form for the Bowen Site—continued

Punctates
- linear close spaced
- linear wide spaced
- circular
  - rowed chevron
  - other (specify)

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